LINUX USER & DEVELOPER

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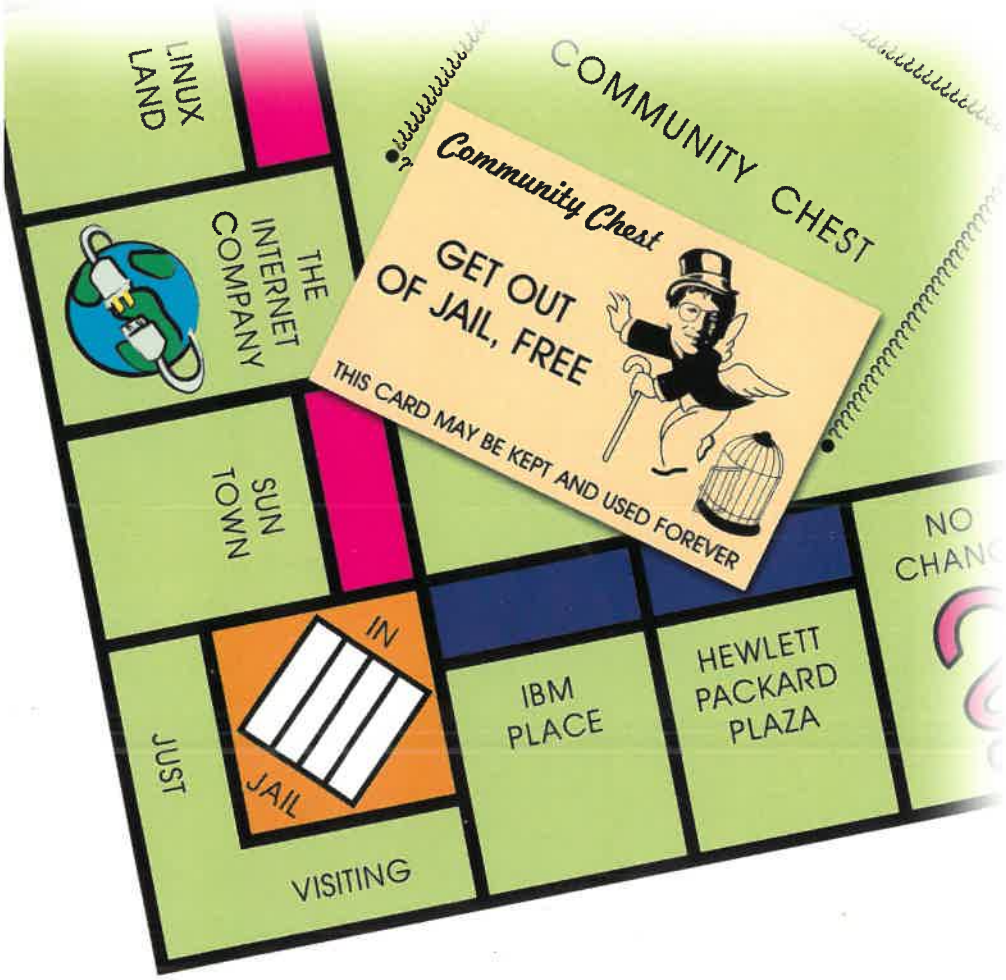
The Linux magazine for IT decision makers

Winning the game

How the antitrust fine has enforced Microsoft's monopoly



System building
Why aren't more OEMs offering ready-made Linux systems?

OpenAdvantage
Open Source advocacy done the professional way

In the mix
Linux goes 3D with Blender - we speak to its founder

Numbers game
A beginner's guide to clustering technologies

The Luddite
Meccano, Open Source, and the freedom to learn

Opinion
Eben Moglen, Danny O'Brien and Richard Hillesley

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ISSUE 39

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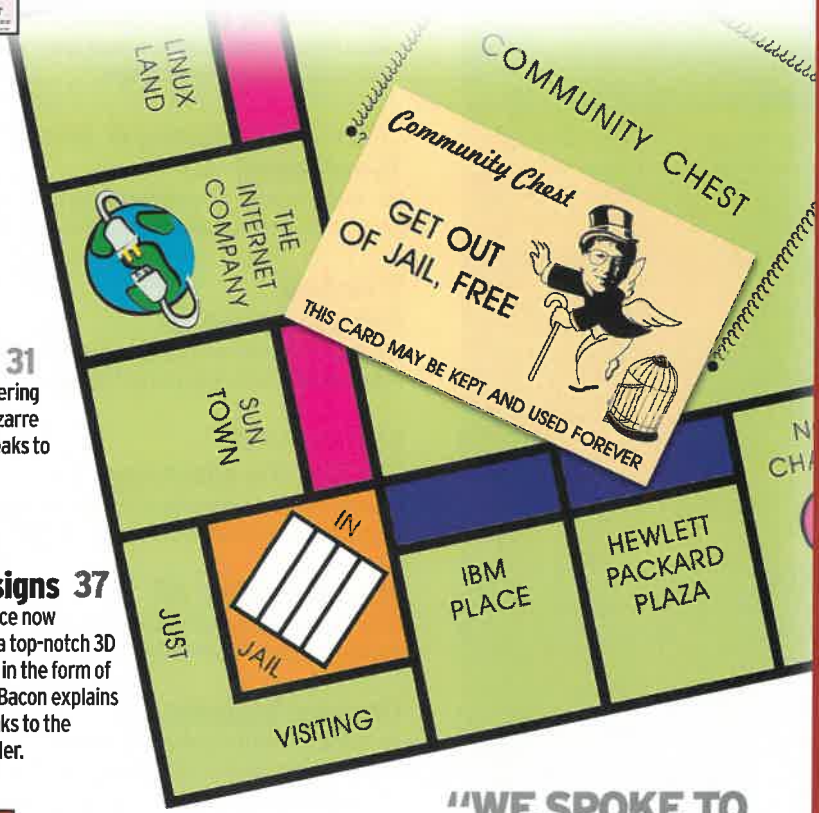

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"WE SPOKE TO SEVERAL SYSTEM BUILDERS. WHAT THEY SAID IS SOMEWHAT SURPRISING"

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LINUX USER & DEVELOPER

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Throughout the magazine we use the word Linux to refer to an entire operating system. This is merely shorthand to avoid confusion for less knowledgeable readers and ease reading. We acknowledge that the full title of the Linux operating system is GNU/Linux.

The Tux penguin graphic was created by Larry Ewing (lewing@isc.tamu.edu) using The Gimp.

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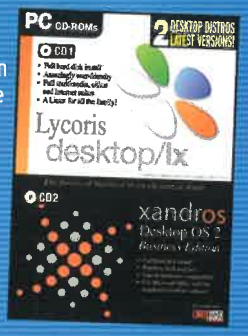
LINUXUSER & DEVELOPER

DEVELOPER SECTION

The Developer section of *LinuxUser & Developer* is a 32-page addition included with the newsstand and paid-for subscription editions of the magazine. These issues of the magazine also come complete with coverdiscs which this month include Lycoris desktop/lx and Xandros Business Desktop 2.0. The Developer section includes HOWTOs, tutorials and features for all level of Linux user, from beginner to expert. To upgrade an existing subscription or take-out a new one, see page 64.



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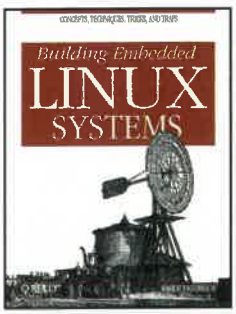
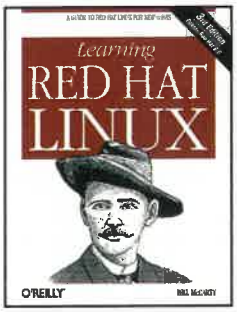
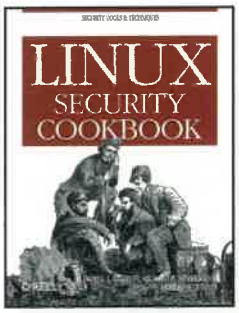


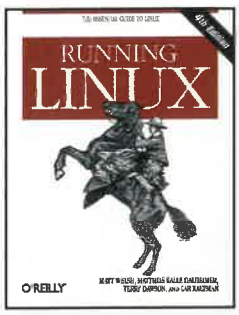
Building Embedded Linux systems
Karim Yaghmour
0-596-00222-X, £31.95



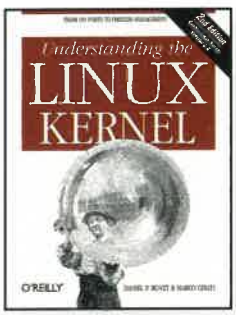
Learning Red Hat Linux, 3rd Edition
Bill McCarty
0-596-00469-9, £28.50



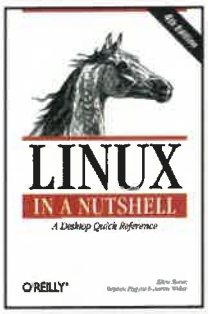
Linux Security Cookbook
Daniel J Barrett, Richard F Silverman & Robert G Byrnes
0-596-00391-9, £28.50



Running Linux, 4th Edition
Matt Welsh et al
0-596-00272-6, £31.95

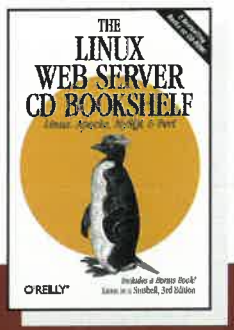


Understanding the Linux Kernel, 2nd Edition
Daniel P Bovet & Marco Cesati
0-596-00213-0, £35.50

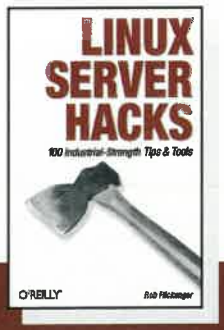


Linux in a Nutshell, 4th Edition
Ellen Siever et al
0-596-00482-6, £28.50

Linux...it's robust, it's crashproof, it's high performance...and it's free!



The Linux Web Server CD Bookshelf, V. 2.0
O'Reilly & Associates, Inc.
0-596-00529-6, £85.50 +VAT



Linux Server Hacks
Edited by Rob Flickenger
0-596-00461-3, £17.50

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Mozilla & GNOME join forces

The GNOME Project and the Mozilla Organisation have created an embryonic project to collaborate in future. The move is being made to combat Microsoft's proposed Longhorn update of its operating system, which will bring with it proprietary Internet standards that will lock-out Open Source software projects.

During a potentially historic conference call on April 21st, key developers from both groups discussed the issues surrounding working together and what their goals were to be. The call featured, amongst others, GNOME's Havoc Pennington, Nat Friedman and Owen Taylor, as well as Mozilla's Brendan Eichman and Bart Decrem.

During the call, the developers acknowledged the threat posed by up-coming Microsoft technologies, such as Avalon and XAML. It was agreed that a response is needed from the Linux community that is likely to be larger than anything a single project can provide, hence the need for collaboration.

Microsoft no longer sees the browser and desktop as separate entities and has combined the teams responsible for each area into a single entity. It's widely believed by many that next-generation desktop operating systems will be seamlessly integrated with the Internet so that users will be largely unaware where their local PC ends and the Internet begins. This appears to be the goal of Longhorn, due for release in 2005.

G·N·O·M·E

To this end, Microsoft is developing its proprietary Avalon APIs, which will allow easy access to online services, as well as its XAML mark-up language, which is currently being tested by Amazon, amongst others, and which will underpin the creation of many of the online services.

During the conference call, the GNOME and Mozilla groups discussed cloning XAML and also developing a project that will be quicker to market than Microsoft's product, thus stopping the Seattle monopolist from dominating the sector.

It was acknowledged that although Mozilla is already a portal platform rather than merely a rendering engine, this aspect hadn't been exploited and was a good place to start building. It was also agreed that the two groups have different goals and models, something that would need to be resolved.

The minutes of the meeting can be found at http://mail.gnome.org/archives/foundation-list/2004-April/msg00008.html.

www.mozilla.org
www.gnome.org

HP desktop move

Hewlett-Packard has announced that it intends to sell desktop PCs with Linux preinstalled. This makes it one of the only major system builders to make such a pledge and the move is all the more significant because HP is one of the largest worldwide retailers of PCs, particularly since it purchased Compaq.

The software will be provided by Novell in the form of the SUSE Linux distribution. However, HP has no plans to abandon Microsoft Windows and the SUSE machines are primarily envisaged as clients rather than powerful workstations or home user machines. The desktop deal follows a similar arrangement to supply Novell software on HP's server range.

According to Martin Fink, HP's VP of Linux, it's likely HP will position the PCs at the simpler end of the corporate desktop market where little more than email and database access is required. Fink also believes the machines will see most use in Asian countries, although HP will initially offer the machines in North America, with expansion planned for other territories.

Research group Gartner responded with a report suggesting that the move was more PR than practical, with Novell and HP keen to show their Linux credentials. It suggested that although Linux is ready for the corporate desktop, it was only for "users performing specific, limited tasks" and was "hampered by high migration costs".

www.hp.com/linux
www4.gartner.com/DisplayDocument?doc_cd=120318

NEWS IN BRIEF

The Japanese, Chinese and South Korean governments are all investigating standardising on the use of Linux instead of Windows. The move has been debated at meetings in Beijing, at least one of which was attended by technology giants Hitachi, NTT Data, Fujitsu, IBM Japan, NEC, and Matsushita. The deal will see the countries sharing their work on Open Source projects. It's being undertaken to reduce the cost of computing as well as to promote economic co-operation between the countries.

The price of the Linux-conversion kit for the PlayStation 2 games console has recently been slashed. The kit, available officially from Sony and designed to foster games development, now costs just US$99 or 149 euros. The deal includes a hard disk supplied complete with keyboard and mouse, alongside a specialised Linux distro. Quantities are limited so those who are interested had better move fast!

http://playstation2-linux.com/

Pingtel Corp. is attempting to create a major Open Source VoIP scene by opening up its Session Initiation Protocol (SIP) software. It's also creating a not-for-profit organisation, which will apparently provide legal and technical frameworks to support the software as well as promote the furthering of VoIP on Open Source operating systems. The organisation will bring together existing projects, such as Vovida, an Open Source SIP, and reSIPprocate, a SIP stack and toolkit.

www.pingtel.com

Antivirus software developer F-Secure has announced a new product for Linux file servers: F-Secure Anti-Virus for Samba Servers. This will look out for both Windows viruses within files on the server, removing them automatically, and Linux viruses. There aren't many of the latter around at the moment, but experts predict that it's only a matter of time, based on the fact that Linux is becoming more and more popular.

www.f-secure.com

The Met Office has announced that it plans to convert around a third of its computers to Linux. The technology will be provided by Novell and its Ximian Red Carpet Enterprise product will be used to enable swift rollout of the

Novell® server release

Novell has announced that it intends to release a hybrid Linux/NetWare server by the end of the year. The new enterprise-level product, dubbed Novell Open Enterprise Server, will somehow combine both NetWare and Linux kernels and will use SUSE and Ximian technologies that Novell has acquired. It will provide a migration path for those using NetWare but offer more up-to-date functionality.

"Stay on NetWare as long as you like..." Novell's Jack Messman announces a hybrid NetWare/Linux product

Enterprise Server will integrate the latest release of NetWare, version 7, with SUSE Linux Enterprise Server 9. It will also integrate the functions provided by Nterprise Linux Services, which was released last year. The new product will offer NetWare services to many enterprise environments that are built around the older networking technology, but would like to utilise the likes of the Samba file server, mail servers, LDAP servers and more.

The announcement was made at Novell's BrainShare conference earlier this year, where CEO Jack Messman said: "This migration path allows you to stay on NetWare as long as you like [...] [Customers] now have the ability to choose between two great operating systems".

It's not clear how this will be achieved, however, and it's also uncertain how many notoriously conservative NetWare users are likely to upgrade.

Up to SCO good

The beleaguered SCO corporation has faced yet more hardships. Principle among these is the news that investor BayStar Capital is asking for its US$20 million investment back. In a series of increasingly barbed communications, made principally via the media, BayStar has accused the Utah-based corporation of breaching parts of the vital exchange agreement that both signed in return for the investment.

BayStar is fundamentally unhappy that SCO is still selling Unix and not concentrating exclusively on its litigation against IBM. BayStar believes the SCO management team lacks the necessary expertise and experience in legal matters of this nature. The venture capital firm also appears to believe that the SCO management is spending too much time producing bravado press statements and fighting the Open Source community.

SCO immediately went on the defensive. "Our company has never been in a better position and we've never been more committed to our Unix business," SCO boss Darl McBride was quoted as saying.

BayStar spokesman Bob McGrath responded in the *Salt Lake Tribune*, saying: "Numerous times this year we raised concern with the board of SCO that their overall effort should be to make the best of their intellectual property assets [...] We just don't see future potential in their [Unix] products."

In other developments, one of the companies SCO has litigated against for using Linux, Daimler Chrysler, has responded in expected fashion, asking for dismissal of the case. The car manufacturer points out that it hasn't used any SCO Unix code for seven years and hasn't contributed any of it towards the Linux kernel, which appears to be the crux of SCO's accusations.

As *LinuxUser & Developer* went to press, SCO stock was trading at just over US$6, a fraction of the US$20 high this time last year.

BayStar doesn't work with UnixWare: the venture capital company has asked for its money back

technology, as well as interfacing with Microsoft Exchange servers. The move is being made to bring the Met Office into line with the academic establishments it has contact with, which it says are usually 'Linux-focussed'. According to a spokesman, it will also help reduce costs.

www.met-office.gov.uk

Linux Networx has built a 556-processor cluster for the National Institute of Advanced Industrial Science (AIST) in Japan. The Evolocity II (E2) cluster system will remove some of the burden from AIST's existing Supercluster and will be used for grid computing as well as bioinformatics and nanotechnology research. It relies upon many Intel Xeon 3GHz chips and runs a mixture of tools from Linux Networx, Clusterworx and ICE Box, which are all brought together under a single interface. SGI is also involved and helped sort out the shared file system, which offers 20 terabytes of storage across the two clusters.

www.linuxnetworx.com

The Debian, Mandrake, Red Hat and SUSE distributions have gone to the extraordinary length of joining together to publicly criticise a report that claimed that Windows was as secure as Linux. The report, published last month by analyst company Forrester, studied the speed at which Microsoft and four separate distro companies patched security vulnerabilities. The authors of the pro-Linux response point out that the original report doesn't rate security vulnerabilities by their severity, making its conclusion questionable. In all cases, most major distro companies patch critical flaws within hours, compared to the days, weeks or even months taken by Microsoft. However, less severe flaws are not addressed by the distro companies until later, unfairly weighting Forrester's attempt to measure response times.

www.debian.org/News/2004/20040406

South African company Twofoxes has released NGO-in-a-box, a starter pack of Open Source packages designed to be quickly and easily deployed within non-governmental organisations. The idea is that the organisations can bring new life to old or discarded PCs using the likes of KDE, OpenOffice.org, thin client technology, and various server and database packages. All are modified for South Africa, meaning they offer the option of local language support.

www.twofoxes.co.za/ngo-in-a-box.html

Corel has announced it's back in the Linux marketplace - at least for the moment. It's planning to release a new version of WordPerfect Office that will run natively on Linux.

Rising Sun

Sun Microsystems has faced a hostile community response as a result of an out-of-court settlement with Microsoft. The litigation between the two computing giants dated back several years and centred on allegations of antitrust manoeuvrings by Microsoft.

The settlement sees Microsoft paying Sun just under US$2 billion, partially to resolve the antitrust allegations and also to set aside patent issues. The two companies, previously described as fierce rivals, are to work together and share technology. Microsoft will further the cause of Java whilst Sun will have access to Microsoft's server technology, amongst other things. Microsoft will also allow Sun access to .NET technology.

The criticism from the Open Source community revolved around fear that Sun, which has embraced Open standards in the past, would undertake a *volte-face* by adopting and furthering Microsoft's closed standards. Java developers also wondered what the move meant for their preferred language.

However, Sun boss Scott McNealy was quick to dispel fears, pointing out that one of his goals was to ensure that Star Office would become even more interoperable with MS Office. Because Star Office has its origins in the Open Source OpenOffice.org project, this will presumably filter through to ordinary users.

Linux advocate and one-time Sun software supremo Jonathan Schwartz has become Scott McNealy's right-hand man

NcNealy also promoted Jonathan Schwartz, Sun's one-time VP of software, to President and Chief Operating Officer, effectively making him his right-hand man. Schwartz kicked-off his new job by announcing that Wallmart stores in the US were to sell the Linux-based Sun Java Desktop, both off the shelf and preinstalled on Microtel-manufactured PCs. This sent out a mixed message to the community, with some individuals welcoming it but others regarding it as slightly ridiculous.

Microsoft's money arrived at an opportune moment for Sun, however, which recently announced losses and has suffered decreasing revenues for the last three years. Around the time the settlement was announced, it laid off over 3,000 staff, including many senior executives.

The huge settlement also shone unwanted press attention on Sun's affairs and several critics suggested that with the arrival of Linux and the increasing use of commodity hardware, the company is effectively left without a competitive product. Sun has responded by furthering speculation that it might open up the development of the Java programming language. It has even suggested that it might put its proprietary Solaris Unix operating system under a GPL licence.

Schwartz has also been vocal in criticising Red Hat's treatment of the Linux kernel, calling it a "proprietary Linux distribution" because of its policy of tweaking and modifying the Linux code. None other than Linus Torvalds came to Red Hat's defence, pointing out that Red Hat contributes developers to the kernel project.

MONO MAKES BETA

Novell has announced that the highly anticipated Mono project has released its first beta. Mono is an Open Source implementation of Microsoft's proprietary .NET framework, and is designed to work under Linux, Unix and even Windows. It's hoped that version 1.0 of Mono will be reached by the middle of 2004.

Mono also brings to Open Source operating systems compilation support for the Microsoft-developed C# language, alongside APIs that replicate .NET functionality, such as ASP.NET and ADO.NET. However, the project also includes entirely new APIs that further enhance GNOME and offers functions that go beyond those offered by .NET.

The team behind Mono say that it's ideal for creating rich client, Web services and server-side applications for deployment on a variety of platforms.

Mono is currently being used within Novell to develop iFolder 3.0, a file system that provides synchronisation, peer-to-peer sharing and metadata handling. It's also being used to work on the F-Spot photo tool, as well as adding functions to the GNOME Nautilus file manager.

www.go-mono.com

Corel will be watching how well the product sells, and its success or otherwise may well decide the company's future Linux offerings. The new version of WordPerfect, version 12, is apparently able to convincingly emulate Microsoft Word, so it may prove attractive in ways that OpenOffice.org or Star Office currently don't.

www.corel.com

Retailer John Lewis has deployed Linux on its new IBM eSeries mainframe. The new system replaces an older Windows setup, which, according to John Lewis' director of technical services, was unable to cope with the number of transactions made. The new system will be extended to the 19 retail outlets the company recently bought from Safeways. John Lewis is one of the first UK blue-chip companies to publicly switch to Linux.

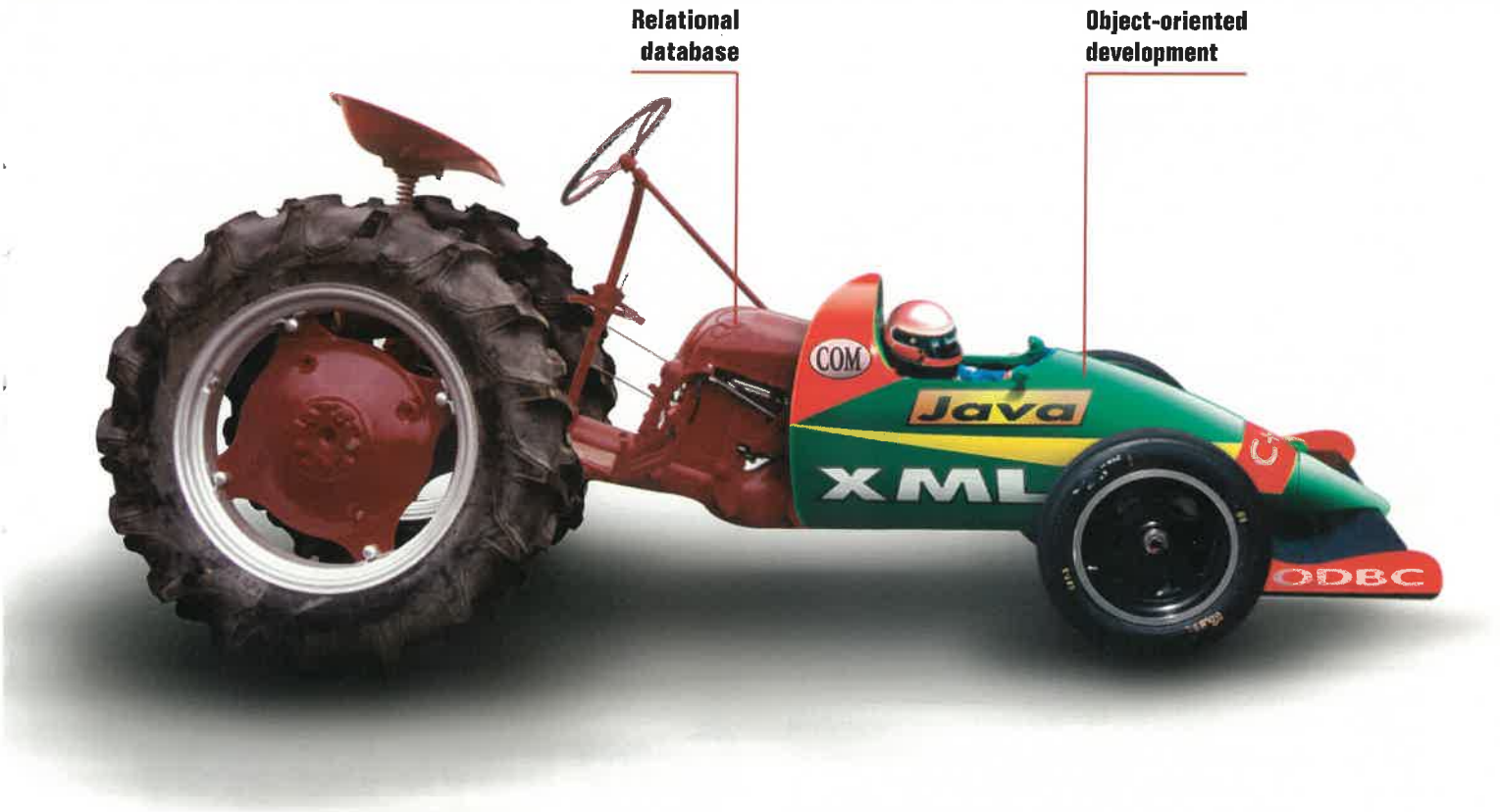
The Yankee Group has published a survey claiming that Linux could be three or four times more expensive than Windows. Mere milliseconds after the report came out, detractors were already on the case. They pointed out the not-insignificant fact that the Yankee Group's survey was sent out to a mailing list headed "W2Knews", which is an "e-zine designed for NT/2000 System Admins and Power Users". The respondents therefore might have been somewhat biased. Detractors also mention the fact the research was funded by a company that makes Windows software tools, as well as the fact that questions were answered via a simple website form that is obviously open to manipulation.

www.yankeegroup.com

Lindows appears to have given up its legal struggle against Microsoft and changed the name of its distro to Linspire. This takes effect worldwide, although the corporation retains the Lindows name. The re-badged distro is functionally identical. To celebrate the change, the company is offering its distro for free, provided it's ordered using a special coupon on its website and downloaded via BitTorrent (a peer-to-peer file-sharing service that relies upon decentralised servers - see the name-change FAQ on the Linspire site). In a separate move, Lindows has fallen foul of the Creative Commons copyright licence by commercially using KDE graphics designed by the artist Knowner on its homepage.

www.linspire.com

SpecOpS Labs claims to have developed what it calls the "holy grail of computing" - software that allows Windows programs to run under Linux. Described as 'middleware', Project David apparently enables the user to not only run Windows programs,



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GNOME 2.6

The latest version of the GNOME desktop environment, 2.6, has been released after a delay caused by an unfortunate breach of security on the project's Web and FTP servers. This delayed many of the 'release parties' that had been organised around the world. The clean-up process largely involved ensuring the various source tarballs hadn't been infected.

The new release brings a handful of major updates and many minor tweaks. The Nautilus file manager has seen a major redesign and is now largely simplified, losing its toolbar and adopting instead a 'parent folders' button at the bottom of the window, which allows users to move backwards within the file system. This is referred to as 'spatial browsing' by the development team, a feature that also involves each folder accessed creating its own desktop window.

Nautilus has gained a significant speed increase and there's now a global 'Computer' location, which is very similar to Windows' My Computer system, allowing access to drives and networks.

A new file chooser dialog has also been incorporated, bringing GNOME up to speed with rival desktop environments and offering the likes of Bookmark locations and an innovative method of moving backwards in the file system, in which each directory is given its own button.

User-definable keyboard shortcuts are now on offer and there's a host of new and/or improved applets, including a better PDF viewer and sound recorder. The innovative Dasher text entry system, designed to help the disabled, has also been incorporated. Additionally, system administrators now have the power to restrict access to aspects of the desktop, which might prove invaluable in an enterprise setting.

The source code is available at GNOME's website, although, as with many desktop environments, GNOME is usually heavily personalised by various distributions and therefore most are dependent on it being made available as an update. However, several testing distributions, such as Fedora Core 2, already incorporate it.

www.gnome.org

GNOME 2.6 has arrived and brings with it many new apps and redesigned widgets, such as the wallpaper selector

PowerPC opens up

IBM has announced that it is opening up the development of its Power processor range of chips. It intends to adopt a Linux-style community model for future work on the CPU architecture, which finds use in IBM's server systems as well as in Apple's range of computers and an increasing number of embedded systems.

Initially this will involve providing once-secret details of the chip's architecture to those who are interested, although IBM is also making specialist design software available, which should allow hardware manufacturers to design and utilise their own custom implementations of PowerPC chips. IBM will retain control of the all-important instruction set, however.

It's hoped the move will make IBM a stronger player in the embedded market. Red Hat and Wind River were amongst the first companies to sign-up to the scheme, presumably with an eye to coupling the processor with their embedded Linux projects.

IBM has also stated that whilst the project will aim to boost performance of the PowerPC range of processors, it intends to move away from clock speed-based marketing and performance evaluation.

www.ibm.com

Cray says no way

Supercomputer maker Cray has hit-out against the increasing use of Linux in High-Performance Computing (HPC) environments, pointing out that Linux clusters are no match for genuine supercomputers. The suggestion was made at the ClusterWorld Conference & Expo 2004 held in April, at which the majority of the vendors were pushing Linux as the next big thing.

"For applications that require low performance, [Linux clusters] are a cheaper solution," conceded Dr Paul Terry, Cray Canada's Chief Technical Officer. However, he pointed out that a cluster's typical sustained performance is usually around 8% of the linear sum of its processor power. Terry claimed that the need to run Linux on each of the clusters added to the waste and made the systems hard to manage.

Terry was at the show to demo Cray's own clustering technology, XD1. Terry claimed that the difference between that and Linux is the software used to manage the array, with Cray's system relying on its Active Manager package.

However, the XD1 was designed to fit a particular market sector and, says Terry, "the commercial environment is still best served by Linux clusters."

www.cray.com

but to retain the general look and feel of Microsoft's operating system. It claims not to be related to Wine or any other kind of PC emulation software. Despite garnering significant press attention, critics point out that some of the technical details sound suspicious, and the lack of screenshots or downloadable code adds to concerns. It also isn't clear what kind of licence the software is to be released under. At the time of writing, the SpecOpS site is working but several of the previously available site entries describing Project David have been disabled.

www.specopslabs.com/david.htm

Red Hat claims to have become the first commercial Linux distro to commit to the Linux Standard Base (LSB) Internationalized Runtime Environment. This will be undertaken in release 3 of its Enterprise Linux product, which will conform to the OpenI18N input framework called IIIMF. This allows on-screen manipulation of languages such as Chinese, Japanese and Hindi, and lets the user switch back and forth between these and other languages.

www.redhat.com

AMD has joined OSDL. This paves the way for even greater acceptance of its CPUs and the AMD64 chip in particular, in the community. According to AMD, the move is at least partially in recognition of the work the Open Source development community has done to embrace the 64-bit processor – Linux has had solid support for AMD64 for some time and key GNU components, such as GCC, have been ported. Several distro companies and organisations already offer 64-bit renditions of their desktop and server distros.

www.osdl.org

GarageGames has released its award-winning game networking code under the GPL. The Torque Network Library is a cross-platform C++ API designed for use in simulations as well as games. Features include robust connection architecture, multiple levels of data guarantee, bit-level compression for optimal bandwidth utilisation, server object replication (ghosting) and management, and much more. The API comes with several example applications to demonstrate the technology, including one that utilises the library's cryptographical functions.

www.garagegames.com/tnl

The Canadian Society, which takes care of parking in Montreal, has announced it is deploying 800 solar-powered parking meters that will run embedded Linux. Each new meter replaces 12 old-style devices. The technology was developed by 8D Technologies, based in Quebec, along with Cale, which specialises in parking

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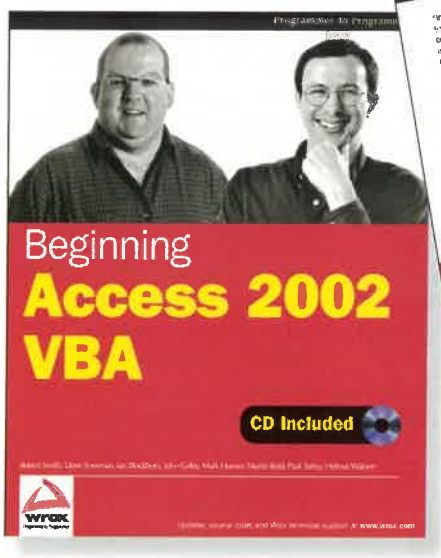

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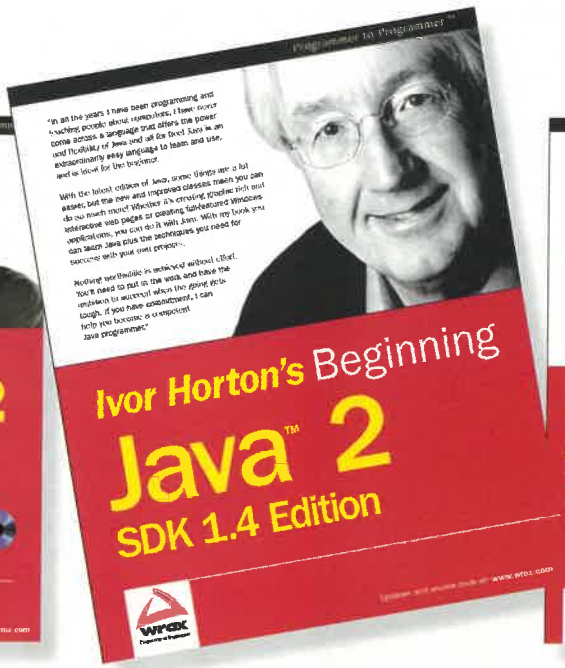

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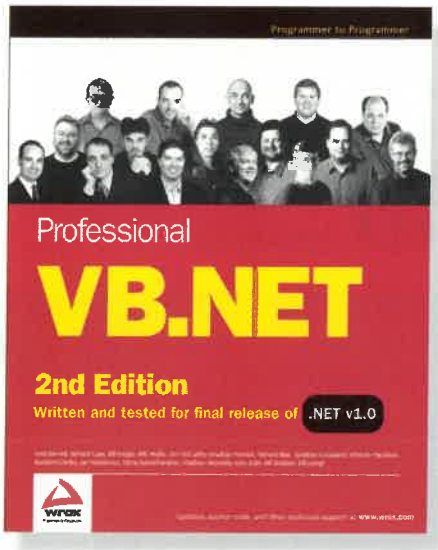

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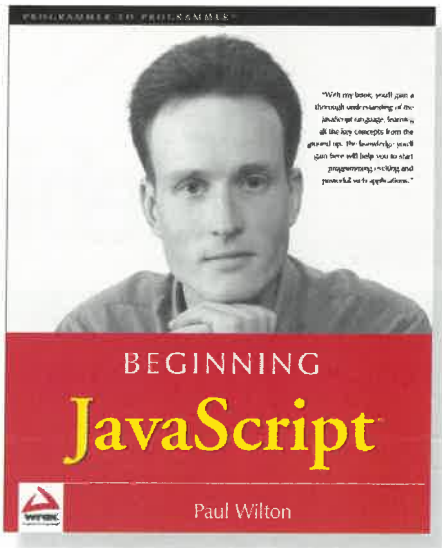

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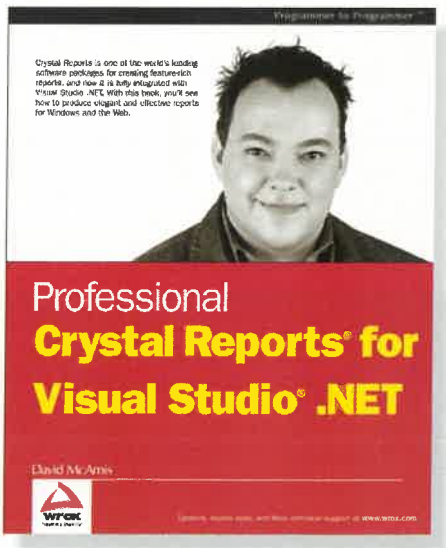

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On a Green Hill far away...

Embedded operating systems developer Green Hills has fired a series of FUD missiles in the direction of Linux. It has produced a series of press releases that claim that the Open Source nature of Linux means that it is inherently insecure and therefore cannot be used in military applications.

In a report unambiguously entitled *Using Linux Software in Defense Systems Violates Every Principle of Security*, based on a speech given by Green Hills' CEO Dan O'Dowd, it is claimed that because "foreign intelligence agencies and terrorists know that Linux is going to control our most advanced defense systems, they can use fake identities to contribute subversive software." O'Dowd goes on to point out that China and Russia contribute towards Linux, something that he says presents serious security issues.

"Linux in the defense environment is the classic Trojan Horse scenario," continues O'Dowd. He dramatically adds: "if we proceed with plans to allow Linux to run these defense systems without demanding proof that it contains no subversive or dangerous code waiting to emerge after we bring it inside, then we invite the fate of Troy."

Response from the Linux community was swift and strong. LynuxWorks' Inder Singh was quoted on the Groklaw site as saying that O'Dowd was making "wild generalisations".

"Mr O'Dowd would have us believe that every foreign developer working with Linux is a spy or terrorist," he said. He continued by pointing out that all code is checked at several stages by the kernel team, making such a Trojan horse scenario impossible.

Singh was joined in his condemnation by Victor Yodaiken, CEO of FSMLabs, who said: "A company that depends on factually challenged and emotional appeals [and] fear of foreigners should inspire some caution."

O'Dowd responded with a second report, presumably designed to pour more petrol onto the flames. "Inserting back doors into Linux is trivial," he wrote, before suggesting that the kernel team could be tricked into accepting innocent-looking code that could then wreak havoc.

"The chance of someone infiltrating a back door into Linux is close to 100% [sic]", he continued, referring to the instance when Ken Thompson inserted a back door into Unix, and ignoring the fact that the Unix and Linux development models vary substantially. He then spends many paragraphs explaining why Green Hills' proprietary INTEGRITY-178B operating system is more secure.

Debian debates

The Debian community has been involved in a series of votes and debates that will raise the project's profile as being the flag-flier for the Free Software spirit. However, it will most likely mean that the next official release, Debian Sarge, will be delayed until 2005 at the earliest.

The vote revolved around a new draft of the Debian Social Contract, the central tenet of the project, which defines its unique attitude towards software and developers. In particular, the new contract states that Debian will not produce operating systems that rely upon non-free components, although it will continue to supply and support such components as part of the non-free and contribs channels.

The word 'components' includes the likes of drivers as well as documentation, which means a large amount of manuals will either have to be discarded or rewritten. It also means that some vital pieces of hardware will not be supported until Free Software modules can be produced. This requires a lot of work, thus pushing Sarge back even further. It is now two years since the last official Debian release, codenamed Woody, although it is possible to download and install current betas of Sarge, which many consider to be stable enough for production deployment.

Although voted through by the Debian developers, the new contract has not met everybody's approval. On the Debianplanet.org site, user 'kostia' summed up the views of some when he/she wrote: "I really love Debian, but think that the recent changes may kill the project or, at least, will harm it, decrease its development rate drastically and require a lot of technically unneeded work." User 'Marceto' followed up by suggesting: "This is like a Christian movement".

The all-important Debian Installer project has also yet to come up with a stable release, although at the time of writing it had entered Beta 4 phase. Part of the delay comes from the hard work involved in supporting Debian's extraordinarily wide-ranging list of architectures and platforms.

www.debian.org

meters. At the heart of each unit is an ARM processor and the units communicate using GPRS mobile phone technology. Traffic wardens (aka meter maids) can check each machine for defaulters by simply driving past it and using a handheld device.

www.8d.com

The Zope Association UK has been formed and hopes to further the promotion of Open Source technology in general and the application server Zope in particular. Zope was made Open Source in 1999 and is written in Python. In addition to its core functionality, it offers several Open Source plug-ins and tools. Current members of the association are commercial users of Zope and want to push for more commercial and governmental take-up of Zope in the UK, where the software is not as popular as it is in the US and mainland Europe.

www.zopeuk.org

Media Excel has announced a real-time software decoder and streaming package for x86-based Linux. The software supports MPEG-2, MPEG-4, and H.264 video, and will work on a variety of low-range processors such as VIA's C3 or the Transmeta Crusoe. The company sees the software being used to eradicate the need for hardware decoding in the likes of set-top boxes or even Internet appliances. Once running, the software utilises just over half the processing power of a 733MHz Celeron processor. Also included is support for multicasting and Video On-Demand (VoD) network operations.

www.mediaexcel.com

In a curious rendition of its 'embrace and extend' strategy, Microsoft has pilfered Karl Aigner, one-time SUSE employee and infamously known as the man who convinced Munich city council to deploy SUSE on its 14,000 computers, in preference to Windows NT. It's understood that Microsoft boss Steve Ballmer wants to use Aigner's expertise to stop a similar thing happening in future.

Ireland's Minister for State with Responsibility for the Information Society, Mary Hanafin, has stated she that thinks Open Source might be too expensive for use in the country's e-government project. She was speaking at the Irish Software Association's annual meeting, which was sponsored by Microsoft, amongst others. However, Ms Hanafin did say that the Irish government would support open standards, regardless of which technology it ended-up using.

www.maryhanafin.ie

A reader of the LinuxDevices.com forum claims to have created a Linux-like

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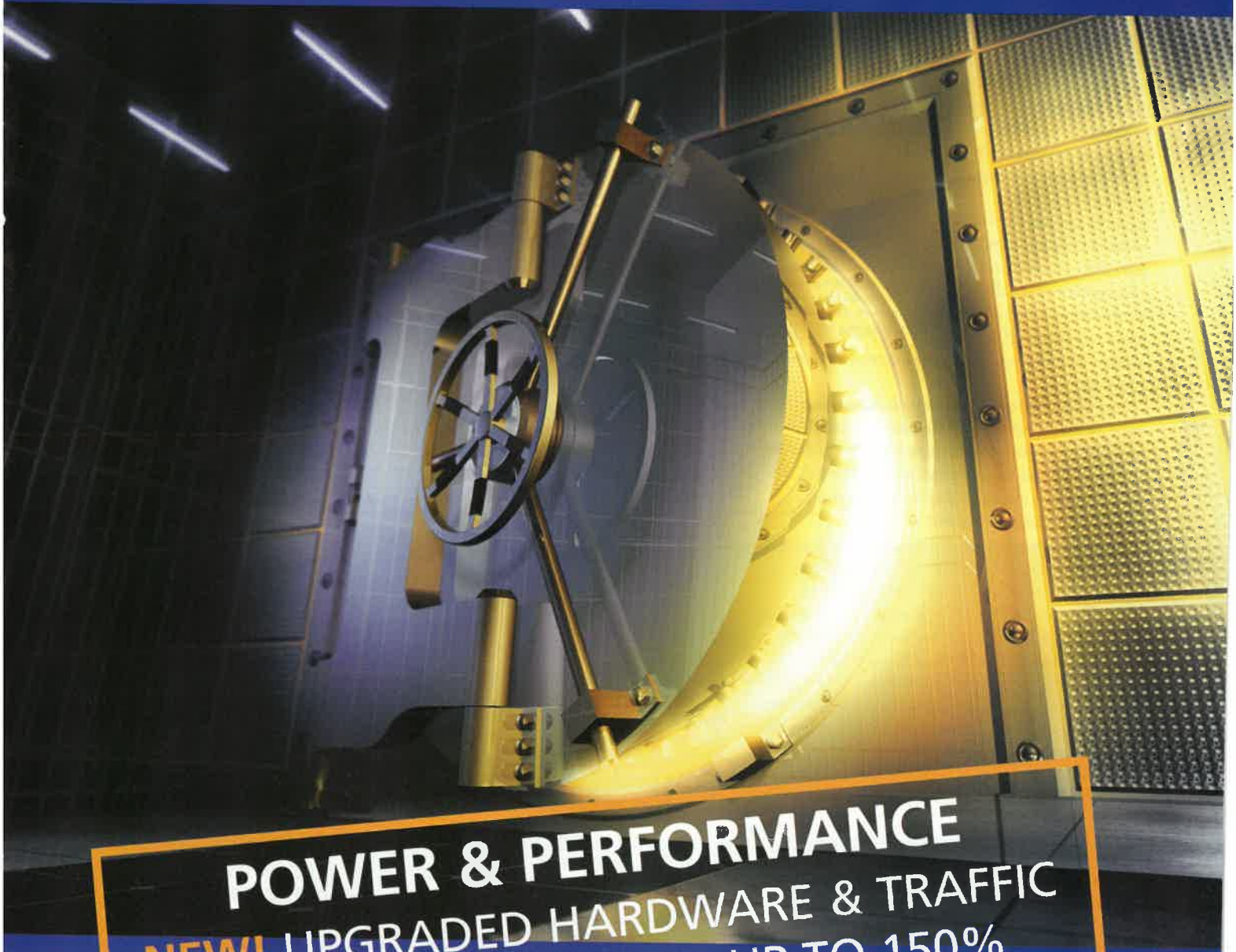

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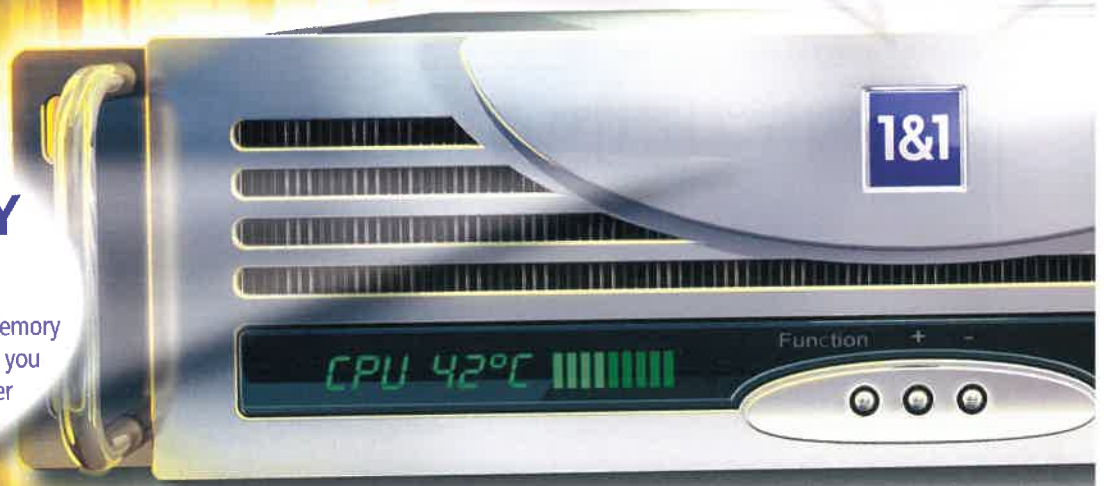

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Coexistence

In the course of several public appearances this past month, I've found myself being asked about 'coexistence' surprisingly often. "Can Free and proprietary software work together?" seems to be the question of the day.

In one respect, the very asking of the question is an extraordinary demonstration of the change in the global software industry, particularly when (as happened recently) I get asked by the Chief Executive of a major multinational software firm. Just a few short years ago, the proprietary software industry was almost entirely ignorant of our existence. Now it's wondering outright about the terms of coexistence.

Sometimes the coexistence question seems to arise in a relatively narrow context, as a question about the GPL: 'How can I have customers run my proprietary application on Linux-based systems without the GPL requiring me to make my application Open Source?'. Put this way, the question reveals deep misunderstandings about how Free Software licences, and Copyleft in particular, work.

I explain that the licensing structure originated by the Free Software Foundation for the GNU Project – licensing the operating system kernel and userland tools under GPL and the C library and other essential API components under LGPL – was specifically designed to make it possible for programs released under any licence terms to be distributed for use on Free Software systems, while ensuring that enhancements to the OS itself would remain permanently Free.

The result is a system that offers coexistence not by accident, but by design. The Free Software movement is committed to the freedom of Free Software, but our licences have been designed to achieve that goal while preserving complete interoperability with proprietary software.

Copyrighting interfaces, and restricting people's ability to program to them, is an unacceptable practice, and in the movement's view is as unacceptable as controlling the content of scientific research through copyright. Our legal theory is consistent with our technical approach: we work with anybody who works with us.

But the issue of coexistence also arises in a larger context: 'How can any large-scale enterprise make money out of this stuff?' wondered one senior manager I spoke to recently. Of course, organisations such as IBM and Hewlett-Packard have realised that they can make money from Free Software. Novell is essentially betting the farm on what we can do, even as Apple has reinvigorated its core business with the massive infusion of Free Software that powers Mac OS X.

WE REGRET THE LOST KNOWLEDGE LOCKED UP IN PROGRAMS THAT USERS AREN'T ALLOWED TO UNDERSTAND

Hardware and services – everything from software support to network architecture – can make money coexisting with Free Software. If, like IBM or Hewlett-Packard, businesses in those lines also have successful proprietary software products, they can often succeed, at least for a while, in fostering their established products against Free competitors. But the balance between Free and proprietary software in the customers' installations is not their primary concern; they can succeed no matter how high up what they call "the software value chain" the principle of freedom ultimately extends.

OF COURSE, ORGANISATIONS SUCH AS IBM AND HEWLETT-PACKARD HAVE REALISED THAT THEY CAN MAKE MONEY FROM FREE SOFTWARE

For the Free Software movement, on the other hand, firms' success or failure in the marketplace is immaterial, just as scientific academies should be indifferent to the price of pharmaceutical shares. We want the knowledge expressed in software to be Free knowledge, available to every user, modifiable by every user, available to be shared among people as seeds are shared among farmers, tools among carpenters, books among scholars.

We regret the lost knowledge locked up in programs that users aren't allowed to understand, and the frustration experienced by technically self-reliant people injured by software bugs they weren't allowed to fix.

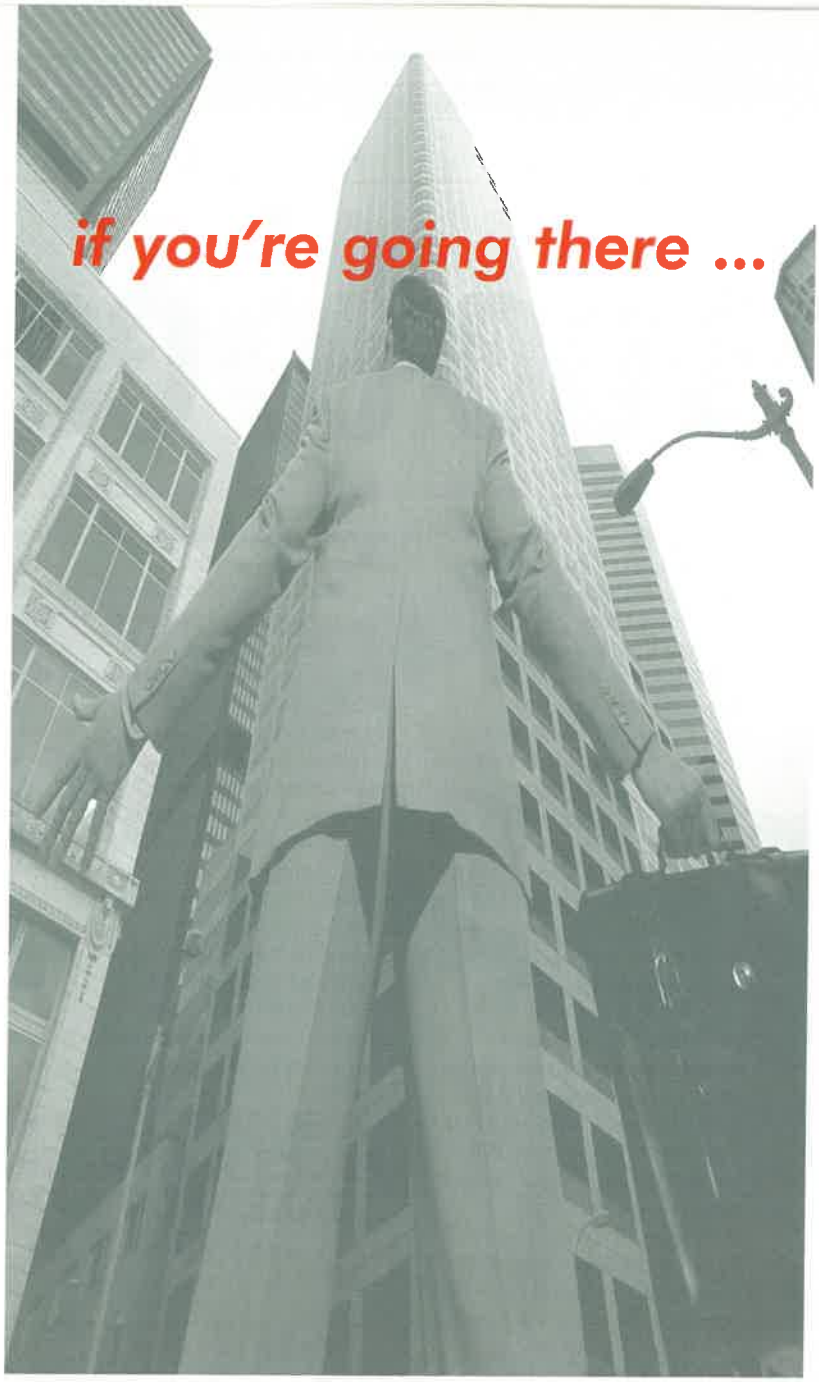
COPYRIGHTING INTERFACES, AND RESTRICTING PEOPLE'S ABILITY TO PROGRAM TO THEM, IS AN UNACCEPTABLE PRACTICE

Monopoly is a problem experienced in the market. What the movement cares about is the technical and social harm pervasive unfree software does in an extensively networked society. Everybody bemoaned the monopoly, ineffectively, until, pursuing our broader aim, we showed them something truly effective they could do about it.

Thus Free Software has become not only a movement for liberty of thought, not only a technological project of endless interest, complexity and power, but also an instrument of competition within a competitive industry. But our sole aim was, and remains, to institute and protect freedom. We have begun rather well. In the next phase of its history, our movement will be part of a new and more complex context: strongly attacked and resolutely defended in the midst of an industry undergoing disruptive change.

Coexistence may well become more difficult.

Eben Moglen is Professor of Law at Columbia University Law School and serves without fee as General Counsel of the Free Software Foundation



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Breaking the rules

I love Linux. As Editor of the world's leading Linux magazine, you might think that a matter of professional decorum, so I'd better explain. I love all aspects of Linux. I love the fact that Linux caters to a wide expanse of the human race – all the way from the smelliest geek right up to the corporate CEO. I love the industry surrounding Linux and I love the community which makes it all work. It's perfect. It's also more than a little peculiar and certainly unique in corporate history.

Nowhere was this better demonstrated than at our recent LinuxUser & Developer Expo 2004. As in previous years, I met just about every type of Linux fan there is. The show was an almost unholy mixture of common-or-garden enthusiasts (those with both professional and personal interests), salespeople, programmers, chief executives, and more.

It's hard to imagine another sector of industry where such disparate types meet, where the geek, who can hardly be bothered to dress in the morning, is as important as the sharp-suited sales executive, to whom image is everything. What's more surprising is that they can talk on equal footing about something both of them love and have an evangelical desire to further the cause of.

What's interesting is what each group wants out of the deal, because it says a lot about the state of modern Linux. To the geek, Linux is an end in itself. It's a maze of fascination and fun. To the corporate interests, Linux simply allows other things to happen. IBM and Sun don't sell Linux. They sell hardware that runs Linux – it's an important distinction. To them, Linux is a catalyst, an oil which lubricates the sales machine. As an IBM executive told me during the Expo, "Linux is injecting new life into old brands".

THE GEEK, WHO CAN HARDLY BE BOTHERED TO DRESS IN THE MORNING, IS AS IMPORTANT AS THE SHARP-SUITED SALES EXECUTIVE, TO WHOM IMAGE IS EVERYTHING

I don't know if you've spotted it but nobody sells Linux any more. The big distro companies don't – they sell things like support contracts and all but throw the CDs and DVDs in for free. They also partner with the likes of IBM and piggy-back their software on the back of hardware deals – a commercial distro company that's not tied to at least one hardware or enterprise software vendor is unthinkable nowadays.

What's ironic is that, once again, the community has been proved right. Nobody was ever happy with companies which 'sold Linux'. How can you profit from something you don't own? Should you limit the availability of somebody else's hard work, especially when they wanted exactly the opposite to be the case?

Yet somehow the oil and water mixed. By treating Linux as a service rather than as a product, everybody's happy. Both the community and big business are pleased with the way things are working. Sure, there are a few dissenters (many of whom are drafting an email to me right now – please do so, I want to hear your views), but, miraculously, big business is making money from Linux and essential freedoms are *not being destroyed*. Think about it – this shouldn't be happening! It contravenes a lot of the rules we take for granted and puts to shame a lot of those who thought the GNU philosophy was fundamentally flawed.

I'm reminded of what was said about IBM back in the early days when it was investing in Linux. Big Blue is a lumbering giant of a company and can wander into an industry and scoop it up. Alternatively, it can destroy it. IBM could have piled money into Linux and driven it in whatever direction it liked.

Yet in its sponsoring and take-up of Linux, IBM was as delicate as it was possible to be. The reason, according to insiders, is that it didn't want to offend the community. Novell is taking a similarly cautious approach at the moment and is winning fans left, right and centre.

IT CONTRAVENES A LOT OF THE RULES WE TAKE FOR GRANTED AND PUTS TO SHAME A LOT OF THOSE WHO THOUGHT GNU WOULD NEVER SUCCEED

Of course, there's a reason why these companies are wise to be so careful – the GNU Public Licence. In simple terms, this said to IBM that it can take what it likes, but it must also share. It also encouraged IBM to be a part of a whole rather than an island in itself. This isn't how corporate America is supposed to work.

The spirit of the GPL somehow infected IBM and, by extension, the entire computing industry. Whilst there's still some way to go, I continue to find it odd that the Linux kernel receives contributions from companies who are direct competitors and, by all rights, should be at each other's throats. Not only that but as the SCO vs IBM case is proving, companies like Novell and IBM are even working together in the courts to defeat a common enemy. The GPL is spreading.

You've got to love Linux. I certainly do.

Keir Thomas is Editor of *LinuxUser & Developer*

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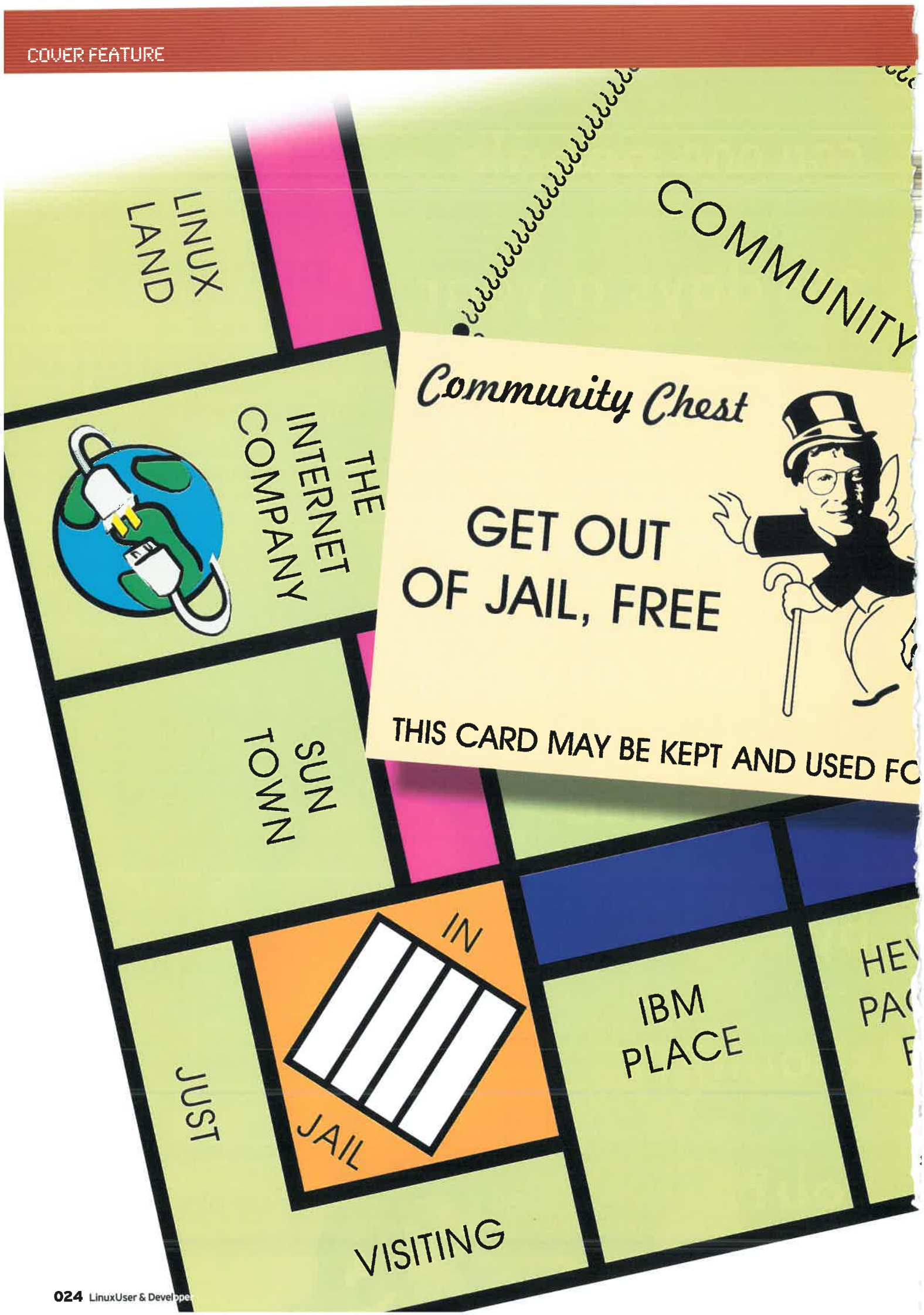
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VISITING

Microsoft recently received a record fine from the European Commission but, notes Richard Hillesley, the ruling reinforces Microsoft's monopoly

GET OUT OF JAIL FREE

In March, the European Commission concluded, after a long investigation, that the Microsoft Corporation had broken European Union competition law by leveraging its monopoly in the market for PC operating systems onto the markets for workgroup server operating systems (file, print, mail and Web servers) and for media players.

The mainstream press interpreted the Commission's judgement as a defeat for Microsoft, and variously congratulated or castigated the Commission for its courage or calumny in bringing the software monolith to book. Curiously, the financial markets saw the verdict differently, and the day after the announcement of the Commission's decision, Microsoft's share value (MSFT) rose by 3%.

The markets may have been swayed by the knowledge that the appeal process will last for several years, by which time the suggested remedies will have little effect. But more astute observers have noted that the remedies will have a negligible impact on

"WE WILL HAVE PROPRIETARY FORMATS TO PROTECT OUR INTELLECTUAL PROPERTY"
STEVE BALLMER, CEO, MICROSOFT

Microsoft's ability to distort the market, and may conversely boost Microsoft's monopoly.

The record fine, which represents 1% of Microsoft's liquid cash reserves, may have resulted in substantial windfall revenues for the Commission but will not impede the company's business practices. As Jeremy Allison, one of the lead developers of the Samba team, notes: "Fines are irrelevant when you have a monopoly. You can fine Microsoft US$3 billion – it will pay the fine out of petty cash, and subtly raise the price of Microsoft software in Europe to get the money back."

Allison appeared as an expert witness at the Commission's hearings, on behalf of the Free Software Foundation (Europe), and advised that Microsoft should not be fined, or that any fine to be imposed on the company "should not be the major part of the penalty".

RECOMMENDED RELEASE

The Free Software Foundation's recommendation was that Microsoft be forced "to release public specifications, and allow them to be implemented royalty-free". Instead, in the view of Hartmut Pilch of the Foundation for a Free Information Infrastructure (FFII), "the small print of the verdict gives Microsoft a green light to kill its main competitors in the operating systems market."

Microsoft has a monopoly on the desktop operating system market, and unparalleled cash reserves. The European Commission found that Microsoft is contriving to extend its desktop monopoly into the market for workgroup servers (file, print, mail and Web servers) by keeping secret the communications protocols that enable its desktop and server products to talk to each other.

"Without such information, alternative server software would be denied a level playing field, as it would be artificially deprived of the opportunity to compete with Microsoft's products on technical merits alone," the Commission warned in 2001. Yet the Commission has stopped short of demanding that Microsoft makes its protocols freely available. Instead, the EU has followed the precedent set by the US Department of Justice, in allowing Microsoft to license its server-communications protocols to rivals on a "reasonable and non-discriminatory" basis, which means that Free/Open Source software projects such as Samba, which provide the only realistic possibility of competition for Microsoft, can be excluded.

At the same time, Pilch observes: "Another arm of the Commission is fighting for the right of Microsoft and other companies to forbid interoperation with any patented standard which they chose to impose by their market power." Internal Market Commissioner Frits Bolkestein's Industrial Property Unit has been urging the Council members to remove Article 6a of the European Parliament's Software Patent Directive Proposal. Article 6a demands that the use of a patented technique for interoperability purposes should always be royalty-free.

Too many commentators have been distracted by the record fine and the contribution it makes to the 'Community Chest', and by the demand that Microsoft offers a version of Windows that doesn't include Windows Media Player. The clause that allows Microsoft to charge royalties on inter-operability is a serious defeat for Free Software developers, and tilts the market in Microsoft's favour. Once again, the monopolist has been let off the hook.

STANDARDS MATTER

Clearly defined protocols are what make interoperability possible. Clearly defined and open APIs (Applications Programming Interfaces) make it possible for startups to innovate and compete. They are necessary because without them networking would not be possible, and it is essential that they are open, documented and free to all.

Tim Berners-Lee invented the concept of the World Wide Web, and gave the idea away. He could have made millions if he had patented the concept and charged others to implement the finer points. Of course, if he had chosen such a one-dimensional route to fame and fortune the Web would have been a different place, and would not have evolved into the universal resource for knowledge and communication it has become today. The Internet had been around for many years and no-one had noticed the benefits except the academics, the Cold War warriors, and the Dead Heads (John Perry Barlow, one of the Grateful Dead songwriters, was a founder member of the

FREEDOM TO INNOVATE

Microsoft trailed the US anti-trust trials as "The DOJ vs the Freedom to Innovate", wrapping its "Freedom to Innovate" website in the Stars and Stripes. The response to the European Commission's judgement has been of a similar order - Microsoft has interpreted the ruling as an attack on its "freedom to innovate".

Despite popular misconceptions, Microsoft's history is not one of innovation. Monopolies do not innovate and will tend to squash any innovation that threatens the status quo. Bill Gates's fortune was built on DOS and the IBM PC, and is under threat from the growing popularity of Linux. DOS was bought from a small company, Seattle Computer, that had written the system as a clone of the then-standard 8-bit CP/M operating system developed by Digital Research. Seattle Computer named the knock-off system QDOS, for 'Quick and Dirty Operating System'. Microsoft made a deal with Seattle Computer which gave it the right to distribute QDOS, later renamed DOS, to an unlimited number of users on behalf of an unspecified computer manufacturer. What Seattle computer didn't realise was that the unspecified computer manufacturer was IBM. All rights were eventually sold to Microsoft for a sum of US$75,000, and Seattle Computer and Digital Research, the true begetters of DOS, are forgotten footnotes in the history of personal computing.

The fortune amassed by DOS was dedicated to buying out the technologies of smaller companies, ensuring that Microsoft's operating system monopoly could be utilised to push an expanding portfolio of products. Each significant part of Microsoft Office was bought in from elsewhere. Ironically, the man credited with the original concept and inspiration for PowerPoint is one of the better known employees of Sun Microsystems, Whitfield Diffie, who is more famous for his adventures in the world of public key cryptography than for his role in devising a program to facilitate slide presentations. PowerPoint was conceived in 1981 when Diffie was preparing a talk at Bell-Northern Research (BNR), and was developed by Bob Gaskins, BNR's Head of Computer-science Research, who took the idea to an ailing Silicon Valley software firm, Forethought, which released Version 1.0 in 1987, in black and white for the Macintosh only. Not long afterwards, the company was purchased by Microsoft for US$14 million, and the first version of PowerPoint for Windows was released in 1990. Word was developed from Bravo; Excel evolved from MuliPlan, and owed everything to Lotus 1-2-3; Access started life as DBase II, and was initially developed by Ashton Croft; Windows itself was an unabashed and deliberate clone of the Apple MacIntosh; early versions of Windows 95 were known colloquially as Mac 89.

"THE FACT IS, TECHNICAL PEOPLE ARE BETTER OFF NOT LOOKING AT PATENTS. IF YOU DON'T KNOW WHAT THEY COVER AND WHERE THEY ARE, YOU WON'T BE KNOWINGLY INFRINGING ON THEM. IF SOMEBODY SUES YOU, YOU CHANGE THE ALGORITHM OR YOU JUST HIRE A HITMAN TO WHACK THE STUPID GIT"
LINUS TORVALDS

Electronic Frontier Foundation). The difference that hyperlinks and HTML gave to the Internet was instant, with anonymous access to images anywhere in the world at any time, and a set of common standards and protocols that were accessible to all interested parties: developers, users, proprietary interests and content providers.

Even so, few would have predicted the rapidity with which the Web has spread to become both a business medium and a widespread accessory to daily life. A patented Web would have stalled at birth, or broken into a random set of fiefdoms on the Net, where each entity attempted to invent its own adaptation of the model – the Sun Microsystems Web, the Netscape Web, the intergalactic pay-as-you-go Web – each with its own versions of the protocols, accessible to the few who paid the licence, and unable to speak across the ether to the other proprietary Webs.

TOO MANY COMMENTATORS HAVE BEEN DISTRACTED BY THE RECORD FINE AND BY THE DEMAND THAT MICROSOFT OFFERS A VERSION OF WINDOWS THAT DOESN'T INCLUDE MEDIA PLAYER

Fortunately for us, Berners-Lee, then a nuclear physicist employed by the CERN laboratory, saw the world differently and realised the value of his ideas both to his own community of scientists and academics, as a means of disseminating research, ideas and information, and to the global community, as a means to achieve access for all. In the hands of any single company the Web would have been a smaller place. As it is, the Web has proved to be a rich environment that has provoked countless innovations in content and in practice.

POLYGLOT WORLD

In a polyglot world, where people exchange information in many different languages and dialects, it is important that there are common reference points to make interaction possible. The philosophy of the Web is that, once the basic rules are followed, everything else becomes possible. Standards give us the means to talk to one another in a heterogeneous environment, whatever applications, operating systems or computer language we use. Proprietary data formats are a hindrance because, by definition, they inhibit free exchange of information, and unless both parties are using the same application, communication is impossible. If I can't talk the language of your proprietary format, I cannot hear what you say and conversation is impossible. The role of the monopolist is to make it difficult to correspond without the proprietary application which is the means to translate the data.

This is why the use of sensible data formats is a necessity in any computing environment. All software, proprietary or otherwise, sits on and depends upon languages, methods and systems that have been determined by common assent, and upon standards set by those that have gone before. Everything could have been different, but wasn't, because common threads of scientific development in computer usage have depended on mutual assent, and have been shared. Very little contribution to the overall development of software techniques was exclusively proprietary, precisely because proprietary methodologies and protocols are exclusive, and create barriers to entry. By that path there is no way forward. If APIs and protocols are proprietary there is no practical reason or justification for anyone else to develop on a given platform and innovation stagnates. Royalties on interoperability restrict competition. From the beginning, the specifications for computer languages were published, and standards were established for the coding of languages, symbols and formulae. These standards were followed by all manufacturers because conformance to the basic rules gave access to common knowledge, and developments were shared. Even Bill Gates himself once observed: "If people had understood how patents would be granted when most of today's ideas were invented and had taken out patents, the industry would be at a complete standstill today." (Taken from a leaked 1991 memo).

STANDARDS GIVE US THE MEANS TO TALK TO ONE ANOTHER IN A HETEROGENEOUS ENVIRONMENT, WHATEVER APPLICATIONS, OPERATING SYSTEMS OR COMPUTER LANGUAGE WE USE

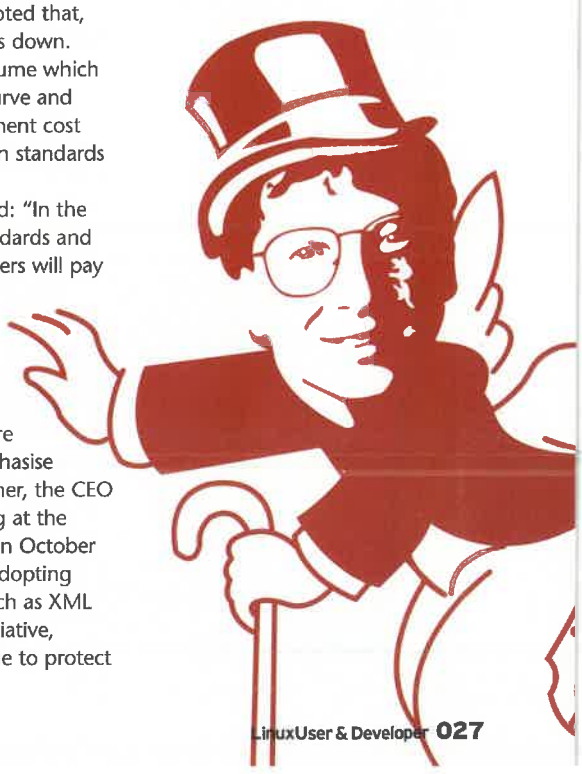
Talking about standards as they affect the semiconductor industry, Jerry Sanders, the Chief Executive of AMD, noted that, "standards drive costs down. Standards enable volume which drives the learning curve and continuous improvement cost reductions. Only open standards do that."

He further observed: "In the absence of open standards and competition, consumers will pay a monopolist's tax." These remarks, made in the context of hardware development, apply equally to the software industry. As if to emphasise the point, Steve Ballmer, the CEO of Microsoft, speaking at the Gardner Conference in October 2000, said that: "In adopting Internet standards such as XML as part of its .NET initiative, Microsoft will continue to protect any intellectual property that it embeds as objects in XML wrappers. We will have proprietary formats to protect our intellectual property."

At the same time, Ballmer promised that Microsoft is "committed to a certain level of interoperability, and is committed to standard protocols." Embedding proprietary formats, of course, defies interoperability, and ensures that the embedded data can only be read by Microsoft software on Microsoft platforms. Nobody should be under any illusions about Microsoft's commitment to maintaining its stranglehold on the market place by any means at its disposal.

SAMBA PA TI

Server operating systems depend on open protocols to interact with the clients. Windows computers speak to each other using the SMB (Server Message Block) protocol. SMB is derived



from NetBIOS, which began as a joint project between Microsoft and IBM. NetBIOS made use of a non-routable protocol, NetBEUI, for small computer networks. Subsequently, NetBIOS was implemented over TCP/IP, and this unhappy union became Microsoft's standard protocol, dignified by the portentous label, CIFS (the Common Internet File System).

Despite or because of its inauspicious origins, SMB/CIFS has become the standard implementation within enterprises to enable communication on PC networks running Microsoft systems, and Samba, the Free Software implementation of SMB/CIFS, has become the most common method of providing interoperability with other systems. The objective of Samba is to make Windows systems truly interoperable with other operating systems, and to promote heterogeneous computing environments. Samba is used to integrate PC-style desktop machines with Linux or Unix servers and clients, and to replace protocols like NFS, DecNet and Novell NCP, especially when used with PCs.

Since the earliest days of Linux, Samba has been the device that has introduced Linux and other Free Software into the enterprise, often through the back door, when frustrated technical staff have replaced Windows NT file and print servers with Linux running Samba without the knowledge of management, and the only comment, according to anecdotal evidence, has been to acknowledge the improvement in uptimes, speed and reliability.

Samba runs on most Unix systems, and many dedicated file and print appliances run combinations of Linux and Samba.

Working on Samba must be like running through a fog – each new release of Microsoft operating systems brings new and hidden extensions to the networking protocol which the Samba developers are obliged to reverse engineer and disentangle.

SMB/CIFS is described by the Samba developers as a bizarre hybrid between an Open and a proprietary standard. Microsoft engineers tend to see the protocol as unique to their own systems; they view the implementation on Windows as correct, even where it deviates from the X/Open standard. The Samba team interprets these deviations as bugs, and describes Samba as "bug-for-bug compatible" with Microsoft. Microsoft has a deserved reputation for being cavalier with standards when it wishes, disrupting interoperability for commercial reasons. Some of the extensions to the SMB protocols are definitely bugs which aren't noticed because Microsoft is only testing its developments against its own systems. Some are unadvertised extensions implemented to fulfil new functionalities, because of the limitations of the original specification, and some may be deliberate obfuscations of the protocol designed to extend Microsoft's presence in the office server market, an ambition that Samba continues to frustrate.

REVERSE MAPPING

That the European Commission has forced Microsoft to make the SMB/CIFS protocols available to paying customers – after signing non-disclosure agreements (NDAs) – might be seen as a small advance in providing interoperability for the likes of Sun Microsystems, but provides no benefits to the wider world. Sun has signed an agreement as part of its US$2 billion dollar settlement with Microsoft that gives Sun's engineers access to Microsoft's protocols. But such agreements are of no use to the Samba developers, or to small and innovative start-ups that require interoperability to be effective. Royalties on protocols go against all the principles of network computing, create barriers of entry, and inhibit innovation and diversity in the workplace.

Moreover, as a direct result of the agreement, Sun's engineers cannot participate in Samba development, although Samba is deployed typically on Sun servers to enable inter-operability. As Allison notes, "It's bought off Sun, and Sun is now off limits." To this extent, Microsoft has won a considerable victory, and has lost nothing in its battle to keep Linux off the backroom servers.

As long as protocols are not open and royalty free, rivals of the monopolist are forced to reverse engineer the binary formats of the *de facto* standard, to make them readable by their own applications – an expensive and wasteful process that acts as a disincentive to competition. Reverse engineering of binary files has a mystique for the uninitiated, but is a logical (if labour intensive) task that involves dumping the data into ASCII and/or hexadecimal or octal formats. The inputs are varied and compared to the outputs, until the embedded commands can be determined. There are other techniques for disassembling and decompiling more sophisticated data.

Microsoft continues to regard proprietary data formats as intellectual property and as a shield against competition, as evidenced by Ballmer's assertion that Microsoft will continue to protect any intellectual property that it embeds as objects in XML wrappers. Microsoft (and other) software licences include provisions that prohibit reverse engineering, but there is no record of any action taken to enforce this proviso, probably because the defence would be that proprietary data formats prevent interoperability and inhibit competition.

In Germany and Scandinavia it is considered legitimate to reverse engineer binary code for the purposes of interoperability. By contrast, the introduction of the Digital Millennium Copyright Act in the US, which makes reverse engineering a criminal offence, has forced »

SUCH AGREEMENTS ARE OF NO USE TO THE SAMBA DEVELOPERS, OR TO SMALL AND INNOVATIVE START-UPS THAT REQUIRE INTEROPERABILITY TO BE EFFECTIVE. ROYALTIES ON PROTOCOLS GO AGAINST ALL THE PRINCIPLES OF NETWORK COMPUTING

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» many Free Software projects to undertake any reverse-engineering aspects of the coding in other parts of the world. The original concept of Samba was to build the code around the X/Open specification for SMB/CIFS, the publicly available description of the protocol, but as Allison describes it, "the spec was a fiction and made no sense. The complexity of SMB is one of the main reasons that NT is so unstable." There were so many special cases that Samba had to be restructured for the 2.2 release, "to do what NT actually does", rather than follow the published specification.

HARD FIGHT

But Microsoft is fighting its battles on several fronts. The flippancy with which the US Patent Office (USPTO) distributes software patents has given Microsoft a tool to combat Free Software projects and to inhibit competition. (It has been estimated that 47% of patents issued by the USPTO are dismissed when brought to court. Unfortunately, the procedure is so expensive that most contestants don't get that far.) In June 2003, Microsoft hired the former IBM patent strategist Marshall Phelps to embark on an aggressive rent extraction program. Phelps also announced his intention to step up efforts to campaign for software patentability in Europe. According to Pilch, "Much of this campaigning appears to have been done indirectly by Microsoft partners."

The invidious nature of software patents and their role in inhibiting software development is well recognised by Free Software developers. In August 2002, the Linux kernel developers were engaged in discussions about improving the performance of the new reverse-mapping mechanism, when Alan Cox pointed out that some of the techniques being discussed were covered by patents held by SGI. A closer look by Daniel Phillips revealed that several existing Linux technologies, including the concept of reverse mapping in general, were included in the patents, issued in 1997. "Yes, it's stupid," he said, "but we can't just ignore it." At which point Linus Torvalds responded: "Actually, we can, and I will. I do not look up any patents on principle, because (a) it's a horrible waste of time and (b) I don't want to know. The fact is, technical people are better off not looking at patents. If you don't know what they cover and where they are, you won't be knowingly infringing on them. If somebody sues you, you change the algorithm or you just hire a hitman to whack the stupid git."

Torvalds later noted that this "may not be legally tenable advice". But he affirmed his point that, "it's impossible to write an interesting program without running into somebody's patent. Rather than worry about it, it's better to just proceed and deal with any problems as they emerge." Linux Weekly News (http://lwn.net) made the observation that "this is probably the only rational approach; otherwise kernel hackers would go nuts trying to find and avoid all of the applicable patents. It's probably only a matter of time, though, until one of these patents bites the kernel in a big way, at least in the US. Those are the times we live in, though."

THE NEXT STEP

Microsoft ensured its dominance in the browser market by bundling Internet Explorer, bought from Spyglass, into its operating systems, and forcing OEMs not to include Netscape on new PCs. A similar approach has been taken to bundling the Windows Media Player, which effectively excludes competing products from the market place. Microsoft is looking to a future where it owns the server space and the Internet as thoroughly as it owns the office desktop, and by similar means, which have little to do with innovation and even less to do with technological excellence.

Avalon and XAML are the Web technologies to be included on the next version of Windows, currently known as Longhorn, will be inextricably tied to .Net and WinFS, and threaten to utilise the desktop and browser monopolies to kill competition. After all, the solution to competition from Linux and Free Software technologies was stated clearly by Vinod Valloppillil in the internal Microsoft reports leaked to Eric Raymond in October 1998 (now known as the Halloween documents) where it was stated: "OSS [Open Source software] projects have been able to gain a foothold in many server applications because of the wide utility of highly commoditised, simple protocols. By extending these protocols and developing new protocols, [Microsoft] can deny OSS projects entry into the market."

The document then proceeds to describe areas in which Microsoft has "de-commoditised" protocols, and can do so in the future with the objective of sabotaging interoperability, a set of events that later versions of Windows seem to be fulfilling, namely: "DNS integration with Directory. Leveraging the directory service to add value [sic] to DNS via dynamic updates, security, authentication." Bundling the Windows Media Player broadens the market for Windows servers, and is a reflection of Microsoft's admitted policy of "embrace and extend", which translates as using its market dominance in one area as a means of stretching and proprietising standards in another, suffocating innovation in the process.

According to Allison: "Microsoft considers the client and server to be two halves of the same product; you don't get the full functionality of one unless you buy the other. If you don't open the protocols publicly you change nothing." The European Commission has missed a historic opportunity to level the playing field: "It didn't have the depth and breadth of vision to see that it is about corporate control. As long as Microsoft can keep its iron fist in control of the protocols and file formats, locking everybody out, spending half a billion to get the Europeans off your back is a small price to pay."

THE FULL MONTI

Microsoft spends US$6 million per annum on lobbying in Washington, DC. On the day that Mario Monti, the EU competition commissioner, made the EU decision public, more than 15 Senators and members of the House of Representatives, from both the Republican and Democratic parties, issued statements criticising the ruling, warning of economic harm to the United States, and predicting a trade war with Europe.

The Republican Senator for Nevada, John Ensign, speaking on behalf of a Senate Republican working group known as the High Tech Task Force, claimed that: "These actions will result in declining exports and decreasing market share and more specifically will mean fewer jobs in the United States," and expanded that the decision "will cost us thousands of jobs in the United States, precisely when we need them most."

The Senate leader of the Republican Party, Bill Frist, said that "the US and the EU are heading toward a new trade war - and that the commission's ruling against Microsoft is the first shot." The implicit threat contained in these statements sits uncomfortably with Microsoft's previous conviction at the hands of the US Department of Justice for anti-competitive behaviour.

Ironically, the initial complaints against Microsoft's anti-competitive practices were brought to the notice of the European Commission by Sun Microsystems and RealNetworks, both American companies. Monti's statement was unequivocal: "Dominant companies have a special responsibility to ensure that the way they do business doesn't prevent competition on the merits and does not harm consumers and innovation. Today's decision restores the conditions for fair competition in the markets concerned and establish clear principles for the future conduct of a company with such a strong dominant position." American companies are not, and should not be, exempt from the laws that apply to European companies.

KEY LINKS

The EuroLinux Alliance:
www.eurolinux.org

Foundation for a Free Information Infrastructure:
http://swpat.ffii.org/

Call for action - software patents in Europe:
http://swpat.ffii.org/papers/europarl0309/demands/index.en.html

From MSWord to MSWorld:
www.netaction.org/msoft/world

World Wide Web Consortium:
www.w3c.org

Engineering Task Force:
www.ietf.org

Electric Frontier Foundation:
www.eff.org

The Halloween documents:
www.opensource.org/halloween

Opening the Windows

Why aren't more system builders offering PCs with Linux preinstalled? Colin Durrant attempts to find out

It's a truly bizarre situation. The PC has powered the computing revolution for around 20 years now and they can be bought all over the world. You can choose whatever hardware you want; you can choose what extra software you want; you can sometimes even choose the colour of the case. But there's one item you have no choice over: the operating system. In most cases, you have to have Windows. Microsoft appears to have a stranglehold over system builders, which it pulls so tight that even to think about dissenting is to run the risk of ruin.

At least that's the accepted wisdom, based on rumour and the occasional leaked memo from Microsoft HQ. But is the truth of the matter more complicated or a whole lot simpler? We spoke to several system builders and sought their views, mostly off the record. The results are perhaps a little surprising.

SYSTEM BUILDING

A brief introduction is necessary in order to explain a few terms. The standard way for a system builder to create a PC is to buy in components and assemble the machine itself. This holds true from small high street retailers all the way up to large corporations, such as Dell. True, the larger corporations claim to have their own supplies of motherboards, cases and miscellaneous other items of hardware, but the fact is that there are relatively few companies supplying PC components, and this means that even Dell and HP buy their motherboards and chassis from China, just like everybody else.

The companies in China that actually manufacture the components are referred to as ODMs (Original Design Manufacturers) and, in turn, they sell to the system builders, who are also known as OEMs (Original Equipment Manufacturers).

Laptops follow broadly the same route, with the chassis and components being manufactured by a variety of third parties, before the actual machine is built by an OEM. Effectively, the OEMs take hardware components and assemble complete and ready-built PCs, almost as if they'd constructed them from a kit made up of ready-made parts.

In general, the corporate make up of the companies we spoke to allowed us to easily categorise them into large and small OEMs. The larger organisations, like Evesham and Transtec, have about a third of their staff dedicated to support and production, while the smaller firms had predominantly support staff with a few sales and admin.

Early on, we discovered results that turned the traditional view of the Linux vs Windows argument on its head. A number of OEMs told us they would provide Linux machines if asked, despite the fact that this isn't flagged in their sales brochures. Some even stated they would provide a machine without an OS so that the end user could install their own. This might not be a Linux machine *per se* but it is perhaps better (and cheaper) than one with Windows XP installed.

OEM POWER

While an ODM is purely a manufacturer, OEMs have the ability and choice to value-add a variety of software to their range of computers. This naturally includes an operating system. Microsoft certainly had its place with nearly all the OEMs we spoke to and boasts a powerful OEM partner program. Companies that are part of this program have to sign an initial agreement so that they can secure competitive pricing based on the quantity of PCs they shift. Such wheeling and dealing is obviously critical to the success of any company and OEMs are in no way immune – the PC industry is built on cutthroat pricing and often practically invisible profit margins.

Value-added retailers (VARs) and distributors also get OEM deals with Microsoft and so secure valuable discounts compared to the competition. In other words, what becomes very apparent early on is that Microsoft is a very powerful company. It has power over its partners and if it wants to put pressure on them not to sell Linux, it can happily do so.

This is a very interesting point and one often quoted by some of the more cynical Open Source advocates. However, we got a mixed reaction when speaking with vendors and OEMs. Linux vendors often state that Microsoft puts legally subtle pressure on its partners not to sell Linux. However, the Windows-friendly OEMs we spoke to said that Microsoft has never approached them regarding the matter.

This is contradicted by a story that appeared on *The Register* website in March 2002. It detailed a memo from Joachim Kempin (then head of Microsoft's OEM business) to Microsoft boss Steve Ballmer. Kempin wrote that he wanted to threaten Dell and

other PC builders that promoted Linux. This was in response to the break-up order by Judge Jackson as part of the antitrust trial. "I'm thinking of hitting the OEMs harder than in the past with anti-Linux," wrote Kempin, "[...] they should do a delicate dance." (This is sure to be a memorable addition to the phrases with which Microsoft enriched the English dictionary during its antitrust trial.)

This backs up earlier memos leaked from the Seattle corporation, saying that it was 'untenable' that a particular key Microsoft partner was promoting Linux. Since then Microsoft has given a number of resources to its partners in order to compete with Linux.

It can be argued, perhaps successfully, that all this is only natural for the continued success of any company. Microsoft needs to have a strategy for dealing with competition.

As part of this marketing push, however, Microsoft hired IDC to write a report that ended-up showing Windows to be more cost-effective than Linux. Experienced Linux users will find the report quite comical in its suggestion that the main cost difference between the two is in staffing, to which it attributes a 62.2% cost difference between Linux engineers and Microsoft engineers. What they have not accounted for is the fact you will probably need fewer Linux engineers due to the OS stability. There was also a sizeable 23% increase in cost due to downtime, which we couldn't quite figure out. The report is located at www.microsoft.com/windows2000/docs/TCO.pdf. One of the biggest ironies is that the report doesn't mention the purchase cost of the software, which is essentially all the OEM is interested in.

WE SPOKE TO SEVERAL SYSTEM BUILDERS AND SOUGHT THEIR VIEWS. THE RESULTS ARE PERHAPS A LITTLE SURPRISING

SUPPORT

By talking to OEMs we found that they tend to provide limited software support for their machines and focus instead on hardware and installation support. Those OEMs that offer Linux told us that, generally, the support required for Linux users was very minimal. There are a number of possible reasons for this. Firstly, the users that buy computers with Linux preinstalled tend to be experienced. They can usually work out any issues they have by themselves, rather than calling on support. Secondly, in the case of corporate rollout of a Linux solution, software and application support would be provided through a Linux specialist software consultancy and not the OEM. Linux machines sold at enterprise level can also be adequately supported by the in-house Linux support team, which considerably aids the OEM selling into this market.

The main software support issues faced by Digital Networks UK, a company that provides preinstalled Linux machines, tend to occur when customers want to reinstall for some reason. They frequently want to upgrade to the latest release or even try a different distribution, but when they reinstall they find they can't get the graphics card to work so they need some help to modify the Xfree86 config file or compile the correct drivers.

Lindengrove, another company that provides a wide range of Linux laptops, workstations and servers, also encounters very few software support issues once the machine has been shipped. Lindengrove mentioned that it sometimes had issues with getting the latest 3D graphics card to work, but this is just a case of finding and compiling the correct modules.

Over on the other side of the fence, when speaking to Linux software vendors, we heard a similar story. Xandros is moving ahead in leaps and bounds in the development of desktop Linux and its latest release (featured on one of this month's *LinuxUser & Developer* coverdiscs), and has pushed itself to the front of the distro pack. A discussion with Xandros highlighted that installation was again the major support issue. Sound cards in particular appear to be causing the majority of problems.

A discussion with SUSE revealed that Radeon and Nvidia graphics cards are supported out of the box, and the proprietary drivers supplied by the hardware vendors are closed source and so will need to be installed manually to get maximum performance, with support usually required.

However, there will always be issues surrounding support and compatibility because some hardware manufacturers simply don't release specifications for the hardware they make.

A further interesting point raised by the SUSE representative we spoke to was the considerable difference in support requests from businesses and consumers. Each group has a very different set of needs. A lot of consumer issues are hardware related, whereas business issues are more often software related, including configuration and maintenance requirements.

NOT SUPPORTED

The support issue became increasingly prevalent during our questioning of the OEMs. Companies that don't currently offer Linux cited support as the main reason for not doing so. Looking at the matter logically, it's certainly true that in-house Linux knowledge will be needed to install and configure the machines, but supporting users after this needn't be hard work. The likes of SUSE offer extensive paid-for support, which could be worked into the costing of the OEM licensing of a Linux distro.

Other distributions tend to offer email support but, in the real world, the main source of support for many Linux users is via online forums. Here you can search for your problem or ask a question and wait for someone to get back to you. In other words, one of the great strengths of Linux – its community – can more than help here.

In the long term it might be that other distro companies will need to consider offering the same level of support and service as SUSE. While support is expensive, at least it is an option that can be used when marketing. We got the impression that there was no perceived centre of gravity within the OEM industry when it came to support, which lead to a lot of 'passing the buck' from company to company.

HARDWARE SUPPORT

One problem Linux faces when used on the desktop is hardware support. New PCs tend to offer cutting-edge hardware and Linux often finds itself playing a game of catch-up in terms of driver support. Windows or Mac OS drivers are usually provided on CD with most new hardware, and whilst this is possible with Linux, many suggest that it's undesirable.

Part of Windows' instability comes from its adaptable nature. Anybody can write a Windows driver and, once installed, have it interface on fundamental levels with the kernel. Because of this, a bug within a driver can take down the entire system, particularly if the driver concerned takes care of basic hardware, such as the graphics card or a RAID card. Microsoft is fighting back with the Windows Hardware Quality Labs scheme, which tests drivers and certifies them as safe, but this takes time to achieve. More often than not it's ignored, particularly by smaller hardware manufacturers.

As Linux becomes more popular, it's very likely that the install CD that comes with the hardware will also contain a Linux driver and the same instabilities as experienced with Windows systems may well arise. If the drivers are Open Source then they can quickly be debugged by any number of third parties and an update can be released (or at least a workaround provided). The problem is that few hardware manufacturers are willing to release details of their products, which they say may contain trade secrets. This forces them to release proprietary-only drivers.

The only solution is for hardware manufacturers to publish the specifications and technical details of their cards from the day of release. The spirit of Open Source has to infect hardware too. This will foster the creation of drivers within the community, which may, in the long run, save the same companies a lot of time, money and hassle.

The moral of the story is that an OEM will only provide installation support. Users will have to organise their own Linux support, either in a DIY fashion or via a consultancy firm in the case of business use.

LOW SPEC

A number of the OEMs we spoke to supplied Linux on lower-end machines rather than high-spec workstations. This was due to cost and the perceived market for the Linux-equipped machines, which were designed to be used for basic tasks rather than complex multimedia work or 3D games.

There is perhaps a pattern developing here. Specialist Linux OEMs like Digital Networks and Lindengrove sell higher-end machines, while the larger OEMs who sell to the mass market predominantly shift lower-end machines with Linux pre-loaded (this assumption, though, is based on a relatively small set of larger OEMs that currently offer Linux preinstalled).

As the perceived market and demand for pre-loaded Linux machines is still quite small, it is difficult for larger OEMs to develop an effective strategy to go after a small market. Although on a huge growth curve with a predicted 20% uptake by 2010, there isn't currently the justification for larger OEMs to produce a range of Linux-based machines (though looking to the future, it's inevitable that OEMs will have to play a major role if the 20% growth is to come about, especially as something like 90% of operating systems sold each year come preinstalled on a new machine).

Until now, our discussion with the OEMs has largely revolved around the desktop and workstation market, which is the core of many OEMs business. The Linux server market is very different. Linux servers have proved themselves to be stable and secure, especially when providing specific services like file and print servers, or mail or web servers, and for the past year SUSE has offered a number of business products that fit in nicely with what OEMs offer in terms of hardware. Linux more than challenges Microsoft in the server space.

EARLY ON, WE DISCOVERED RESULTS THAT TURNED THE TRADITIONAL VIEW OF THE LINUX VS WINDOWS ARGUMENT ON ITS HEAD

Yet somewhat ironically, the pricing for such Linux software matches the Microsoft model and, like Microsoft, is based on yearly subscriptions. You can also buy support as long as you have maintenance and the use of Linux appears early on to be a rather costly exercise. However, when you compare the cost of support with that of having a full-time Linux technician onboard, it is easier to swallow. Remember that end users don't actually get support from Microsoft. There is no help line or email support service free with Microsoft products.

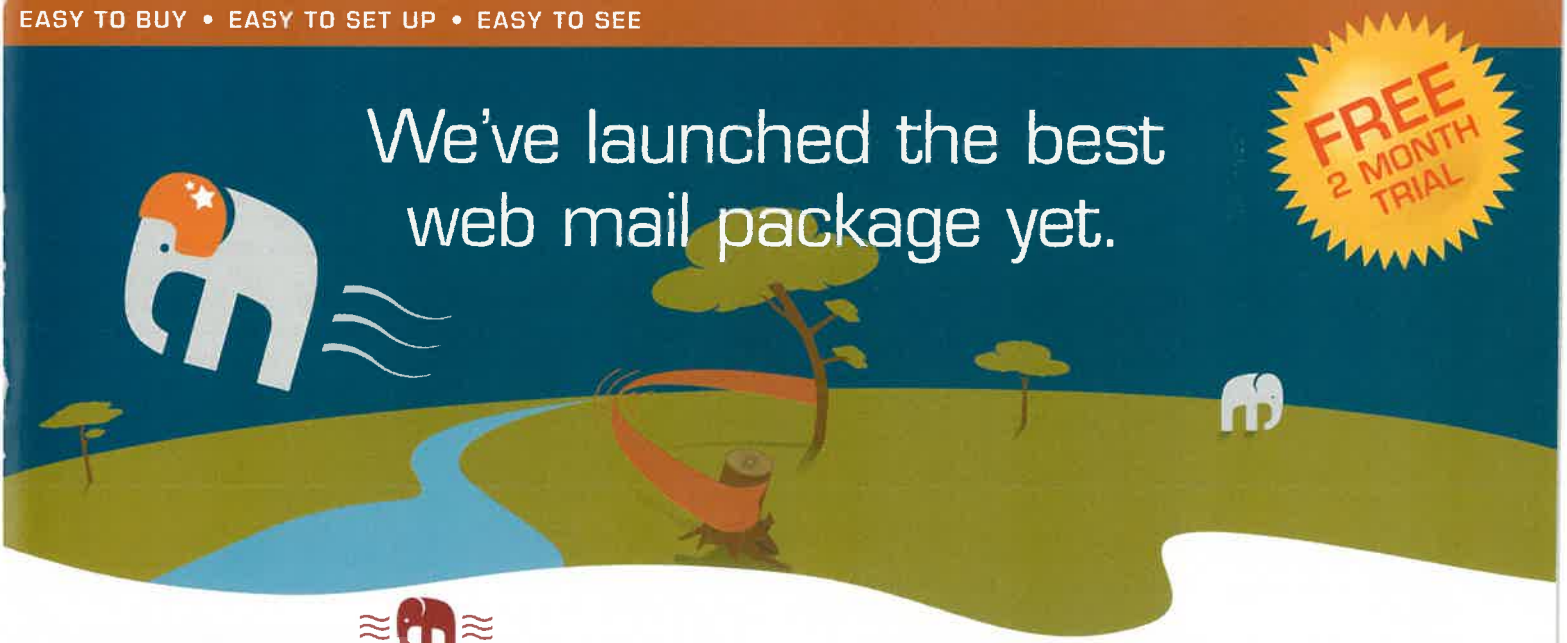
However, SUSEs products take the responsibility away from the OEM wishing to sell the SUSE business range of products. They can sign up to their partner program and leave the support and maintenance up to SUSE.

SPECIFIC COSTS

Depending on the choice of vendor or distribution, licensing Linux products can either be easy or difficult. SUSE appears to have a rather complex price list for its business products, which depends on the hardware platform and number of users. If an OEM is selling a Linux server, it needs to make sure that its customer will be compliant with the licences and build this into the initial costing. Of course, grabbing a free .iso in order to run a file server or desktop won't incur a cost for a licence and, because of the nature of the GPL, is entirely legal (discounting those distros that use proprietary software). This is where IT directors are seeing the benefits and, hence, investigating the possibility of using Linux within their organisations.

If the Linux market is split into three segments – Retail,

EASY TO BUY • EASY TO SET UP • EASY TO SEE



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Business and Education – it may appear that the majority of distro company marketing and promotion is aimed at the business and enterprise market. Having spoken with various vendors, including SUSE and Xandros, this wasn't really the impression we got. SUSE has been particularly strong in the retail market and, hence, has performed considerable marketing in this area. This includes the release of its latest version of SUSE Personal and Professional 9.1. Its business products have only been around for the past 18 months, so while marketing efforts are increasing, the company doesn't want to ignore its current strengths.

Xandros tends to concentrate on the business and consumer markets, although it does offer a massive 45% discount for education. They have products for all three sectors.

It is when costing is considered that things start to look interesting from an OEM point of view. For example, Xandros comes in at these price points: Standard, £28; Deluxe, £57; Business Edition, £81; and Business Edition 5 pack, £299. There are corporate licence discounts for over 20 users and, of course, an education discount. US customers can buy online from www.xandros.com, while UK customers can buy online from www.xandros-software.co.uk.

need, with no further purchase of software necessary (unless the user works in a highly specialised field). The Xandros Business Desktop package even provides CrossOver Office, which allows the use of Windows software such as Microsoft Office.

SUSE has a number of agreements with OEMs throughout Europe, but very few in the UK. But then again, with a first order minimum of 5,000, only a limited number of the larger OEMs within the UK will be able to meet this target.

WORD OF MOUTH

Perhaps the main reason for the lack of OEM take-up of Linux is that the computer-using public hasn't heard of it. The OEM marketplace, like any business, works on the law of supply and demand. If people ask for Linux, they may well find that OEMs provide it.

Linux is very much community-based and -driven. Word of mouth and reviews are really the only powerful marketing tools. This means you don't have to believe the rubbish printed on the box but rather rely on someone else testing the product and telling you their opinion. But this does mean that word about Linux rarely gets beyond the high walls of the community playground.

In contrast, Microsoft pumps a huge amount of money into marketing on TV, at events and trade shows, on bill boards, via

IT CAN BE ARGUED, PERHAPS SUCCESSFULLY, THAT ALL THIS IS ONLY NATURAL FOR THE CONTINUED SUCCESS OF ANY COMPANY

SUSE Linux Desktop 1 (corporate) only sells in packs of 5 at £410 and this only includes one year of maintenance.

To give you a comparison, Windows XP Professional OEM costs around £120 while the full version will cost closer to £170. The latest version of Microsoft Office 2003 will bite at £400. Graphics software starts from £80 up to £400 depending on your specific requirements. Microsoft Project software? £480, please! Bear in mind that both SUSE and Xandros provide everything the user is likely to

sponsorship, and so on. For Linux to get a similar quantity of recognition, there needs to be a comparative amount of exposure. This will be very difficult when competing against the marketing budget of Microsoft, but it is arguably the only real way that Linux will get recognised by Joe Public and be able to push forward.

The general Linux take up is being pushed by IBM, which is basing much of its TV and print advertising around it, plus Hewlett-Packard, which has recently pushed a load of

SOMEWHAT IRONICALLY, THE PRICING FOR SUCH LINUX SOFTWARE MATCHES THE MICROSOFT MODEL AND, LIKE MICROSOFT, IS BASED ON YEARLY SUBSCRIPTIONS

desktops running TurboLinux into Asian markets, including those in China, Hong Kong, Japan, India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand and Vietnam.

The Far East OEM market differs from that of the West because Japanese, South Korean and Chinese officials have all expressed concerns about becoming too dependent on Windows, especially in the government sector, and are exploring alternatives. At least in this part of the world, Linux is poised to become an especially strong competitor to Windows. HP has said its Linux PCs would be targeted at "emerging markets, where Windows PCs are not used so widely".

Microsoft has other problems in Asia, including an investigation by Japan's fair trade watchdog into the suspicion of monopoly law violations. Agents from the Trade Commission raided Microsoft's Japanese offices February 26th this year, looking for evidence that the company attached improperly restrictive conditions in its software deals with computer makers.

RISING SUN

Government officials in China have said a new law will be announced by this summer, requiring a minimum percentage of software purchased by the government to be produced in China. That's crucial in a country in which the government accounts for 25% of the US$30-billion software market. China has its own Linux distribution called Red Flag (www.redflag-linux.com) and HP has put considerable investment into this particular venture, while IBM bundles software products (DB2) with Red Flag. Danny Huang, VP of Red Flag Linux, was recently quoted as saying: "In China, the red flag has a lot of positive meanings. It stands for encouragement, bravery, and revolution. So I think it really matches Linux."

China's reasons for preferring Linux are multiple. Officials often say they feel safer with an Open Source operating system, because a proprietary system such as Microsoft's Windows may contain hidden back doors that programmers can use to evade security and gain access. Microsoft revealed its source code to the Chinese Government in an attempt to alleviate that concern last year, as it has done with other governments and a number of Universities. Only time will tell if this move by Microsoft will make any difference to the Chinese (or Asian) market and the inherent suspicion of the American company's perceived worldwide monopoly.

The conclusion to the OEM argument is that there are a lot of positive things happening for Linux, which is set to experience a huge growth curve. But the fact remains that the market is currently too small for every OEM to justify making the investment and meeting the challenges. Initially, smaller OEMs will probably lead the way until Linux appeals to the mass market. And because the current Linux buyers are primarily buying the hardware, it will be experienced users who want to speak to someone who knows about Linux and not a general sales line. This will probably also apply on the corporate side. Finally, it's worth remembering that for companies moving to Linux, it is as much a management decision as it is a technical and a cost decision. This will be based on marketing, reviews and case studies, and Linux is currently weak in these regards.

KEY LINKS

Leaked memo from Joachim Kempin:
http://www.theregister.co.uk/2002/03/19/microsoft_killed_dell_linux_states/

IDC report on Linux vs Windows:
www.microsoft.com/windows2000/docs/TCO.pdf

SUSE:
www.suse.com

Xandros:
www.xandros.com

Red Flag Linux:
www.redflag-linux.com

Open Source professionals

Samuel Palmer talks to Marc Fleury of JBoss, one of a new generation of companies that has based its business model on Open Source software development

In 1988, before Linux and Apache, Michael Tiemann and others created Cygnus Solutions, a company dedicated to selling support for the software that had been produced by the GNU project. Cygnus, according to Richard Stallman, is a recursive acronym for "Cygnus – Your GNU Support", just as GNU is a recursive acronym for 'GNU's Not Unix'.

Cygnus Solutions can be considered to be the true pioneer of the Open Source business model and Tiemann its first proponent. Tiemann is also an accomplished developer, having written the GNU C++ compiler, which is claimed to have been the first native code C++ compiler. Cygnus Solutions proved that it was possible to run a viable enterprise marketing Free Software and distributing under the GPL, by providing professional training and sales support. Cygnus became a model for building a business around Free Software, a model that was developed with some success by Bob Young and Marc Ewing at Red Hat. Unsurprisingly, Tiemann's company was one of the first acquisitions made by Red Hat after the stock market flotation in 1999, and Tiemann is now Red Hat's Chief Technology Officer.

WASTED NEWSPRINT

Much newsprint has been expended on whether Free and Open Source Software can be exploited as a model for business, too much of it informed by the glittering but ultimately hollow cash mountains erected around the dotcom boom and the ostentatious billions made by a handful of closed-source software businesses during the Eighties and Nineties. Nobody running a business built on Open Source software is likely to accumulate the wealth of Bill Gates or Larry Ellison, but that doesn't make the model untenable, as Novell has realised. Open Source offers considerable opportunities for support, maintenance, education and training that can produce realistic and competitive returns for an ambitious organisation.

One such organisation is the JBoss Group, founded by Marc Fleury. In 1999, Fleury was a Java software engineer working for Sun Microsystems, when he decided to jump ship and develop an Open Source application server based on the Java 2 Enterprise Edition (J2EE) specification, financed by his earnings from consultancy work. What Fleury realised was that middleware requires considerably more support and services than the Open Source software sold at the operating system level, and that a well-founded support organisation based around a successful product could also help to finance the developers of the software, and thrive and grow.

Fleury, who was born in Paris and is now based in Atlanta, Georgia, doesn't conform to the archetypal hacker prototype of popular mythology, although each of the products that JBoss handles is licensed under the GPL or LGPL. Fleury believes that as the market for Open Source expands, the expectations of Open Source developers are also maturing. JBoss belongs to a second generation of Open Source companies that provide a different model for Open Source programmers. "Our model is professional Open Source," says Fleury. "I want to distinguish it from pony tail Open Source," or the common perception of Open Source programmers as a band of volunteers or lost poets hacking away in sleepless garrets.

HANDFUL OF BEANS

JBoss began as an Enterprise Java Beans container and is now a full J2EE framework with which developers can build their own applications.

"We grew the project to have a full micro-kernel, full services, and complete J2EE implementation," Fleury explains, "reaching a state of middleware maturity that led to new market demands and a new form of company. The market demanded new developments and increased support."

As the popularity of JBoss has grown, so have users' demands

"OUR MODEL IS PROFESSIONAL OPEN SOURCE. I WANT TO DISTINGUISH IT FROM PONY TAIL OPEN SOURCE"

for more options and additional functionality, above and beyond the training and consultancy support that JBoss also provides. The company has grown to serve the market, providing 24/7 support and accepting investment from a venture capitalist (VC), although Fleury observes: "We haven't taken money from VCs until now, because we didn't need the money, which is a good position to be in when you are negotiating with a VC."

The extra funding has allowed Fleury to pour more money into expanding the business and investing in further development. Fleury is ambitious for the company and is intent on maintaining profitability. According to a BZ Research *Java Use and Awareness Study* conducted in November 2003, the JBoss application server was deployed in 26.9% of organisations responding to the survey, which is double the percentage recorded the year before and out-distances most of its commercial rivals. JBoss has opened a European office in Neuchtel, Switzerland, and now employs 32 lead developers from a range of Open Source projects, including Tomcat, Hibernate and JGroups, as well as co-ordinating a large and loose-knit community of Open Source Java developers.

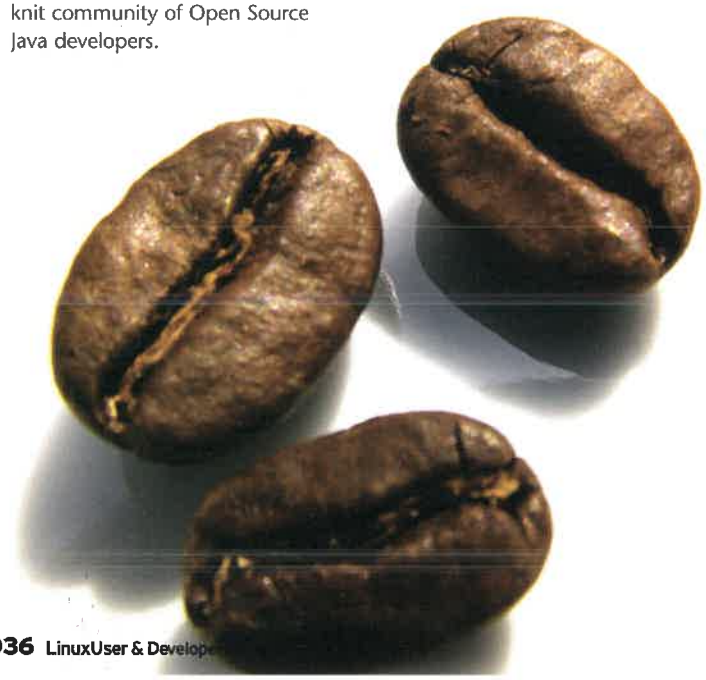
According to Fleury, JBoss is "innovating now beyond the J2EE standards, doing aspect programming, for instance; delivering a new class of middleware software, close to what Microsoft is doing with .NET, enabling simpler interfaces to existing applications. We are expanding the JBoss brand. JBoss doesn't mean just the JBoss application server, but a new federation of projects with a 'for profit' mindset."

OPEN OFFERS

JBoss has adopted a number of Open Source projects that have proven successful and whose lead developers have shown a professional ambition. "We employ them," says Fleury. "We give them stock in the company and they become part of JBoss Inc."

"CUSTOMERS WANT TO DEAL WITH OPEN SOURCE OR FREE SOFTWARE, BUT THEY WANT TO DEAL WITH A VENDOR ... THEY LIKE THE FREEDOM THAT OPEN SOURCE PROMISES"

In some cases, JBoss has funded development of new projects. One such project is Nukes, an enterprise-level portal that is a port of Postnukes from the php world, rewritten in Java because "Postnuke wouldn't scale to what we needed." For other projects, such as Hibernate, JBoss has recruited the lead developers and adopted the project as part of the JBoss suite of Open Source products. A better-known example is Tomcat, the Java servlet container employed by Apache. Fleury points out: "Tomcat is still officially an Apache project, but we control the project to all practical purposes. We employ the lead developers. Today, Tomcat is mostly maintained by JBoss." JBoss now supports and maintains a wide range of Open Source Java projects.



In return for employment by JBoss, the developers offer support and a consultancy service to the users of the software. JBoss has a profitable consulting operation that includes all the developers employed on JBoss-supported projects. The Open Source nature of the code, which JBoss doesn't own any more than any Free Software is 'owned' by its users or developers, gives JBoss access to vast reservoirs of research and development, as well as a deep pool of talent from which to draw recruits.

"We are at a point where JBoss is deployed in increasingly mission-critical environments, and the customers demand mission-critical support," says Fleury. "They want to deal with Open Source or Free Software, but they want to deal with a vendor entity, meaning that they like the liberty of the licence. They like the freedom that Open Source promises, but they still want the accountability and safety net that the vendor provides. So we try to mix the two models. This is what we call Professional Open Source. We're Open Source but we are professionals. Training courses are a lucrative business, so it's easy to maintain a profitable stance with that, but people buying maintenance from us give us the bulk of our revenues. We are pushing innovation in a very young field, middleware, and expanding our footprint. But we want to become the company that is known for Open Source Java middleware support. Clearly that's our ambition."

"FOR US, OPEN SOURCE IS A WAY OF MAKING A LIVING ... WE WANT TO GROW BIG. WE HAVE ALWAYS BEEN PROFITABLE AND WE CAN BE OPEN SOURCE PROFESSIONALS"

For Fleury, JBoss is defined by its association with Open Source: "We built this company from the developers upwards, federating all these projects into a big community of Open Source developers that share a common interest in JBoss Inc. I am always scouting for talent – Open Source guys who have a project that has taken off. They're yearning for a professional model that enables them to continue working with passion. It's a different model to the corporate Open Source that you see a lot of today, even with Linux to some degree. Where is Linus Torvalds? Why doesn't he have Linux Inc? IBM is making the money, or Red Hat selling Linux packages. We seek out guys who want the professionalism and want to work full time, whose projects are relevant. We have no rush to grow but in two or three years time we may have 100, 200 or 300 of the top brains in Java Open Source. What defines us is that Open Source is maturing. JBoss and MySQL are the second generation of Open Source companies. For us, Open Source is a way of making a living, not just as an employee of IBM. We want to grow big. We have always been profitable and we can be Open Source professionals."

"WHERE IS LINUS TORVALDS? WHY DOESN'T HE HAVE LINUX INC? IBM IS MAKING THE MONEY, OR RED HAT SELLING LINUX PACKAGES"

Open designs

Blender is taking Free Software into the niche market of 3D modelling, writes Jono Bacon, providing a much-needed alternative to proprietary solutions

The world of 3D visualisation and computer graphics is one steeped typically in the expense and complexity of proprietary environments. For many years design houses and studios have formed a close relationship and dependence on a short range of 'industry standard' applications. Examples of these heavyweight leaders include 3D Studio Max, Maya, Lightwave and Houdini.

The dominance of these tools has been largely associated with the technical flexibility and extensibility of these applications. Many studios take these stock tools and then build upon and extend them. This has produced a culture of vendor dependence in an already limited market. But there is now a new choice – Blender.

HUMBLE BEGINNINGS

The Blender modelling, rendering and animation application started out as in-house software for the Dutch animation studio NeoGeo. Ton Roosendaal was in charge of in-house software development and Blender was created to provide a means for NeoGeo to maximise on their productivity.

Although Blender was developed around in-house needs, it was decided that it should be made available on the Internet. At this time, in the late Nineties, Blender was gaining some support from a community of artists who could let their imagination run wild with software that cost nothing to use.

Ton saw the potential for Blender and decided to create a new company called Not a Number (NaN) that was dedicated to further developing Blender, providing support services and otherwise ensuring the prosperity of the tool. NaN secured some strong investment interest. At one time it employed nearly 50 employees and garnered around 4.5 million euros in venture capital.

Unfortunately, the potential for Blender as a corporate services model could not be assured and NaN eventually shut down. This was perhaps because of a tough economic climate, some criticism of the Blender usability, and an already tight market through which it had to penetrate.

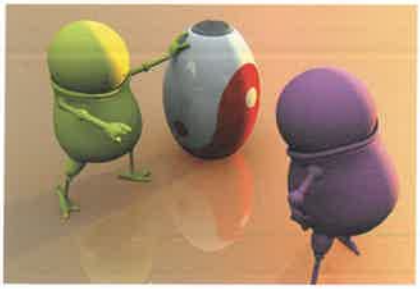
Despite the promise of a free 3D studio with impressive functionality, the market was simply too restrictive for the software to flourish commercially. Blender was also not a complete system and the practical commercial resources could not be sourced to develop the software quick enough to match its commercial counterparts.

LIMBO DANCING

At this point in time Blender was in a state of limbo. There were over 250,000 users of the software, with an impressive catalogue of artwork and animation made with the tool, but the source code of Blender was locked into the lifeless body of NaN.

For many, Blender was written off and considered a missed opportunity. Roosendaal, bruised but not defeated, set forth to create the non-profit Blender Foundation with the objective of fully open-sourcing Blender once and for all. The dream was of a powerful Open Source 3D studio that leveraged on the creative and technical talent of the Free Software community.

There was no doubt that this dream was a pipe dream at the time, and Roosendaal needed to approach the investors and reach a deal in order to Open Source the software. After some meetings, a deal was struck to sell the software and intellectual properly to the community for 100,000 euros. This brought into being the Free Blender campaign to raise the funds. To the surprise of Roosendaal and onlookers, the funds were raised in just seven weeks. This short time indicated the true depth of interest in Blender and the commitment of the community behind it. The culmination of the effort piqued



Blender lets the user create stunning 3D artwork and provides one of the only Free Software modellers

on 13 October 2002 when Blender was made freely available under the GNU Public License (GPL).

When Blender was GPLed, the software faced new challenges. At this time there was a large community of artists and users but a short supply of developers. The more restrictive licensing of Blender in previous years had limited its potential for collaborative development and Roosendaal was well aware that he was going to need help to promote this product to developers.

Blender had long suffered from complexities in its user interface that prevented it from more generalised use, and these complexities needed to be overcome in the new era of a more contemporary Blender.

In addition to these challenges, documentation was sparse, the code was complex and expectations were high. This portfolio of challenges needed to be approached sensibly and resolved, with resources to ensure the community could get involved. Roosendaal worked to set up a strong development resource to manage the source code (and its updates), and he also worked hard to build the professional presence of Blender.

DESPITE THE PROMISE OF A FREE 3D STUDIO WITH IMPRESSIVE FUNCTIONALITY, THE MARKET WAS SIMPLY TOO RESTRICTIVE FOR THE SOFTWARE TO FLOURISH COMMERCIALLY

RAISING STAKES

In many ways Roosendaal upped the ante of typical Open Source projects. For numerous projects, a Sourceforge account is registered and mailing lists are set up to manage development of the application. But the Blender developer resource base is an entirely different affair.

Roosendaal has worked with other contributors to the Blender project to set up a set of resources that not only revolve around Blender but also around other projects and services that augment Blender as a platform. This has included special codebases to explore new features and design paradigms, distributed render farms and other projects.

It is clear that from the outset Roosendaal has envisioned this as being a 'platform' as opposed to an application. Blender is creating the opportunity to provide a means to facilitate the different requirements of an artist and studio in one multi-platform environment. Although a lofty goal, this objective naturally needs to be managed in such a way that Blender does not become a free-for-all compromising on its primary focus as a 3D modelling system.

It is clear that Roosendaal is taking a pragmatic and original approach with Blender's new focus. Although many Open Source projects typically choose to emulate the success of commercial counterparts or equivalents on other operating systems, the Blender team is taking a different route. The developers who are part of the project are determined to maximise Blender as a tool in its own right, pushing Blender onwards at the right pace, and keeping the developers and users happy and excited for the future.

FUNDING

The Blender project is also interesting in the way that it is funding itself. Roosendaal has worked with other community

ROOSENDAAL SPEAKS

To get a clearer focus on the new direction of the Blender project, we spoke to the leader of the Blender community, Ton Roosendaal. Roosendaal has worked hard to raise the profile of Blender and provides an interesting insight into the plans for the project.

What will be the direction for the Blender Project in 2004?

For me, it's still a matter of stabilising the source code and making sure more developers can co-operate on projects. Because it was once developed in a closed source fashion, it still doesn't suit efficient Open Source collaboration.

For example, libraries and modules should have clean APIs, with well-documented functionality and dependency. But this is a tremendous job! The direction also depends on what developers like to contribute. This is mostly based on what is easy, at least to start with, but becomes more and more an issue of advanced added functionality.

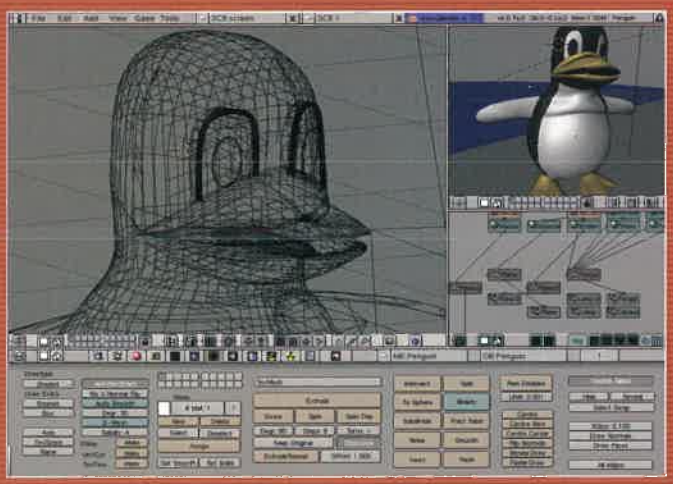
Next to that, this year I want to start small research projects to prepare for a full makeover of Blender, also known as Blender3.

Blender has been typically criticised on its rather obscure and complex user interface. How do you plan to improve this?

We did a lot of research with active users. This has resulted in a design document for work on the 2.3 series of Blender. Unfortunately good UI coding is not something that's easy for developers to pick up; few people contribute to this aspect, so some projects for the UI go slower than expected.

A lot of remarks about Blender's interface are based on wrong assumptions. For example, there's the idea that Blender is a tool for beginners and should therefore have an easy drag-and-drop GUI. Artists using Maya, 3DS, XSI etc also admit it takes a long time to master the complexity. But as with those tools, Blender is for motivated people who want to be seriously involved with 3D.

There's also the incorrect concept that Blender should be like 3DS or Maya or XSI, which is a criticism based on the previous experience of some users. People learn one way of working and then think this is a standard. Blender has – like every program – its own unique character and workflow. That's not good or bad – it's just a matter of preference.

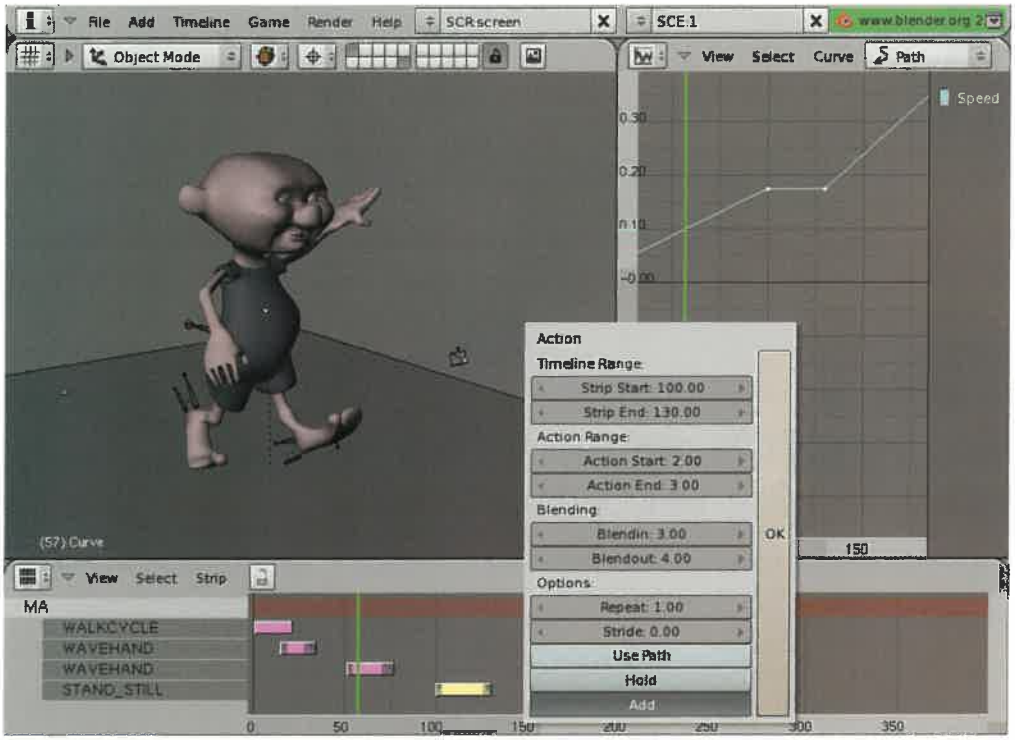


Blender is often criticised for having an esoteric user interface, something which is being addressed by its developers

We're also up against the idea that Blender should be accessible to a large audience. Here the problem is that there are not many good Open Source 3D creation suites (yet). We currently suffer from the fact that people have no choice of what program to use, and so complain more. I would welcome more competition in this field.

On the positive side, we've found that going Open Source worked well. With the code available, any developer (and even artist!) can give their ideas for improvements in the UI a try. A lot of contributions to the Blender code were based on such experiments.

members to work on a full and complete manual that documented the new Blender interface and features. This manual needed to sell 1,000 copies to break even and eventually had over 1,400 pre-orders before books even went on sale.



Unsurprisingly, Blender finds a lot of use amongst game designers

Roosendaal signed the first 250 copies of the book and fans of the project lapped this offer up. The fact that Roosendaal has cut his teeth commercially with Blender means that choices for the Blender Foundation such as this have been wise and were based upon previous experience.

Although the Blender Foundation has been challenged in the past and succeeded in many areas, the future holds yet more challenges. Blender is beginning to head in a direction of true commercial potential with a growing community of experienced Blender artists. This is not only making Blender an option for art direction and animated feature production, but there is a community of Blender enthusiasts on tap to be employed by these companies to create their productions.

As Blender continues to mature and progress this growth can only continue, making it an ever more compelling opportunity for low-cost 3D imaging.

Do you feel that Blender is a viable 3D production suite for commercial users?

Sure! But that depends on what you define as commercial. What you see a lot on public CG forums is people showing off their skills with Maya and the other commercial 3D suites. One might conclude that this is beyond what Blender can offer, which is sometimes true.

But what many people don't realise, is that such artwork is rarely truly commercial. Clients won't pay you for working long days on a single cool-looking image that takes forever to render. In daily practice, strict deadlines and limited budgets – and nasty clients! – are the important factors to take into account. Blender's background as a tool for a small 3D animation studio still pays off in this regard. This might not be sexy but is certainly valuable. For many commercial 3D artists, Blender gets it right. You won't likely see much of that on the Web – it doesn't show off so nicely in galleries dominated by people who have plenty of time and present their work as 'professional'.

THIS MANUAL NEEDED TO SELL 1,000 COPIES TO BREAK EVEN, AND HAD OVER 1,400 PRE-ORDERS BEFORE THE BOOK EVEN WENT ON SALE

Blender also still suffers from a 'cheap' public image. Started as Freeware, with a small executable, that just can't be good! Related to this, there were numerous issues in Blender that made it outdated, such as how the UI was designed, or the internal rendering system. The nice thing is that, thanks to Open Source, these issues can now finally be tackled.

You say that Blender is good for small animation studios – do you feel that Blender will always target this audience or do you want to raise Blender's profile to target much larger studios?

When you have a good creation suite to help individual artists and small companies making a living, there's no reason why bigger studios won't adopt it too! The other way around is less true. There's also not much sense in targeting larger studios whilst they're still being served very well by the commercial tools.

We have to accept our limitations; I would be extremely proud with just having a flourishing Open Source community around Blender. We have to make small steps, and keep feasible goals in mind.

What efforts is the project making to secure adoption of Blender?

In reactions we get here, it's clear that more people – including people creating 3D commercially – are using Blender. This is not based on our efforts though... apart from me trying to get magazines writing about Blender!

Open Source PR is difficult. We have no budget or volunteers who can spend time on that issue. Spreading the word and making sure we can keep an active and happy user/developer community still works best.

At the present time, how well does Blender stand up to its commercial rivals such as 3D Studio Max, Maya and Lightwave?

That's a difficult question. Blender has in many ways a unique position and working method, which suits some users well, but which scares people away too. If Blender had been released as a commercial package it would have been easier to emphasise this special character. But with a free product – and now an Open Source one – a lot of people somehow assume Blender should be accessible by everyone.

In general we try to make sure that whatever Blender can do, it should do in a competitive way compared to other 3D tools out there. Nevertheless, programs like Maya, 3DS or XSI are much more complete, so not something I think we compete with.

There's also the integration into Blender of a real-time 3D engine and tools to create interactive environments (with game logic). Bridging the gap between traditional 'linear' animation and creating games is something I still find challenging, and something Blender can offer better than the other 3D suites out there.

Lastly, the price for Blender is unbeatable! And the fact that you can also use the source code is not something other packages offer!

LINUX USER & DEVELOPER AWARDS 2004

OpenForum Europe

The LinuxUser & Developer Awards 2004 were held on 21 April 2004, and recognised excellence in the field of Linux and Open Source

On 21 April 2004, London's Royal Lancaster Hotel was overrun with penguins when it hosted the LinuxUser & Developer Awards 2004. This gala event was hosted by comedian Sean Lock, who ensured the evening went with a swing. He also announced the awards, which are the biggest and best in the industry and aim to recognise excellence in the Linux arena. The awards were part of the larger LinuxUser & Developer Expo 2004, which took place from 20-21 April at London's Olympia.

In total there were 12 panel-nominated award categories, which were judged by an esteemed panel that included the editor of *LinuxUser & Developer*, Keir Thomas, as well as Consultant Editor Richard Hillesley and other industry luminaries. Five reader-nominated awards were also presented, which were voted for via the official LinuxUser & Developer Expo 2004 website in the months leading up to the Expo.

"The aim of the awards was to recognise the very best in product and service solutions, as well corporate and personal contributions in the Linux industry," said Maggie Meer, publisher of *LinuxUser & Developer* magazine, who gave the opening speech. "This year we have witnessed the highest number of entries to date, making the judges' job extremely difficult, but also indicating the increasing popularity of Linux within mainstream IT."

This year the awards were in association with OpenForum Europe, an indepedent body setup to further Open Source in business, and Graham Taylor, its Programme Director, was on hand to present the awards.

THE WINNERS

BEST OPEN SOURCE PROJECT
OpenOffice.org
Sun Microsystems

BEST ISP/INTERNET HOST
Positive Internet
The Positive Internet Company Ltd

BEST SERVER APPLICATION
Red Hat Enterprise Linux 3 AS
Red Hat

BEST EMBEDDED LINUX
Qtopia
Trolltech AS

BEST LINUX DEVELOPER TOOL
IBM WebSphere Studio Application Developer
IBM Corporation

BEST USE OF CGI WITH LINUX
DreamWorks

BEST DATA STORAGE SOLUTION
Arkeia Network Backup
Arkeia

BEST DESKTOP ENVIRONMENT
KDE 3.2
KDE

BEST DESKTOP APPLICATION
Ximian Evolution
Novell

BEST LINUX SYSTEM BUILDER
DNUK

BEST BUSINESS SOLUTION PROVIDER
ITS Linux
ITS Linux

BEST LINUX MARKETING CAMPAIGN
IBM Prodigy Advertising Campaign
IBM

READER-NOMINATED AWARDS

BEST LINUX DISTRIBUTION
SUSE Linux
A Novell Company

BEST LINUX HARDWARE
Athlon 64
AMD

BEST LINUX OR OPEN SOURCE SOFTWARE
Mambo Open Source
Mambo Open Source Project

CORPORATE CONTRIBUTION TO LINUX
IBM Corporation

PERSONAL CONTRIBUTION TO LINUX
Linus Torvalds

Best Open Source Project:
OpenOffice.org

Best Embedded Linux:
Qtopia

Best Server Application:
Red Hat Enterprise Linux 3 AS

Best Data Storage Solution:
Arkeia Network Backup

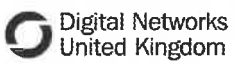
Best ISP/Internet Host:
Positive Internet

Best Linux Developer Tool:
IBM WebSphere Studio
Application Developer

Best Desktop Environment:
KDE 3.2

Best Use of CGI with Linux:
DreamWorks

Best Desktop Application:
Ximian Evolution



Best Linux System Builder:
DNUK

Best Business Solution Provider:
ITS Linux

Best Linux Hardware:
Athlon 64

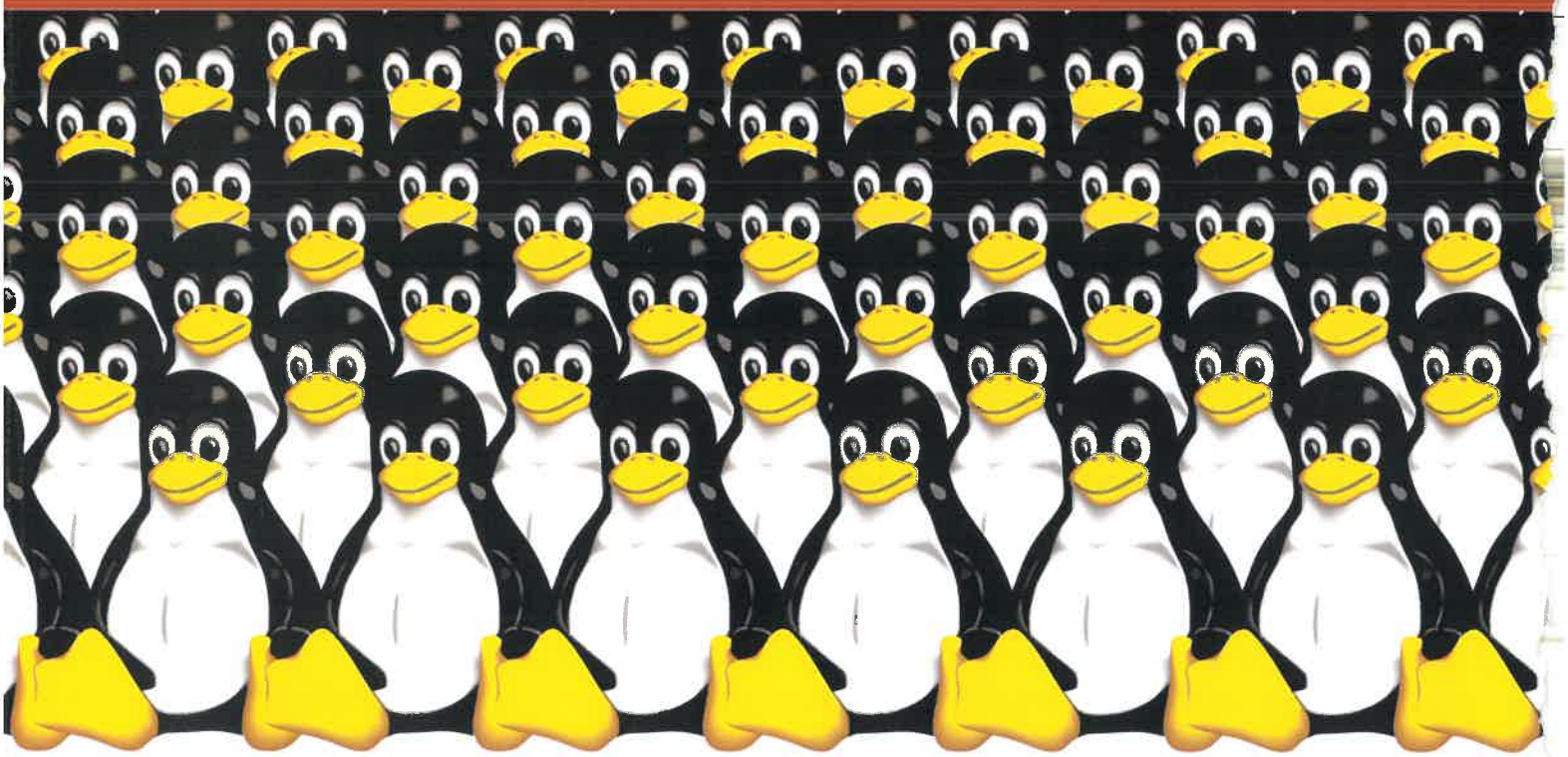
Best Linux Marketing Campaign:
IBM Prodigy Advertising Campaign

Best Linux or Open Source Software:
Mambo Open Source

Best Linux Distribution:
SUSE Linux

Personal Contribution to Linux:
Linus Torvalds

Corporate Contribution to Linux:
IBM Corporation



Strength in numbers

Clustering is one of the current Linux buzzwords but how does it operate and what can it offer for the average business? Martyn Honeyford explains

Clustering is a general term used to refer to individual computers – called nodes – which are combined together to perform a task. There are a number of reasons why you may like to build a cluster; each reason brings with it differing requirements and different hardware solutions.

In general, clusters are usually separated into three main types. The first category is High Performance Clusters (HPC). This type of cluster is typically used in scientific and engineering applications with the aim of performing complex calculations which would not be feasible to undertake on a single workstation computer. Historically, this type of application would require an expensive specialised supercomputer in order to execute in a reasonable timeframe. Advances in clustering technology have meant that it is now possible to combine commodity off-the-shelf (COTS) hardware, such as normal x86-based PCs, into clusters which give supercomputer performance at a fraction of the cost.

The second category is Load-Balancing Clusters (LBC). The aim of this type of cluster is to spread the computational/network load of a task among many different nodes to increase throughput and decrease latency. This enables businesses to maximise the return on their hardware investment by ensuring that the hardware is kept busy as much of the time as possible. There are a number of ways that LBC-like functionality can be achieved, including a simple fan-out algorithm at application level. Many Web servers have this facility – the original request goes to a single node and it is then fanned out to one of a number of nodes which serve the content. This can also take the form of full operating system support, where processes are automatically migrated between nodes according to CPU load.

The third type of cluster is High Availability (HA) Clusters. The aim of this type of cluster is to maintain at all times the availability of a computing resource (such as a database or Web server). Typically, an HA cluster will consist of two or more nodes which have similar (often identical) sets of hardware and software. The clustering software and/or hardware keeps the data in sync between the nodes; then, if one of the nodes fails, one of the other nodes takes over so that the end user sees little/no loss of availability of service. This process is often referred to as 'failover'.

MUTUALLY EXCLUSIVE

Note that whilst these are the three main types, they are not mutually exclusive. It is possible to construct a load-balancing cluster which also has high availability traits, for example.

Now that we are familiar with the main types of cluster, let's take a look at each type in more detail. We'll try to examine what facilities they can provide and how they might be implemented under Linux.

BECAUSE PROCESSING IS SPREAD ACROSS NODES, THE RISK OF FAILURE IS ALSO SPREAD OUT

In the application domain of high performance clusters, we are typically dealing with an extremely computationally intensive application – that is to say, an application which performs many millions/billions of numerical calculations. Such applications are often also CPU-bound – they spend the vast majority of their time using CPU cycles rather than waiting for I/O. Examples include physics modelling applications, medical applications and engineering applications.

If the calculations required are so complex that they cannot be performed in a reasonable amount of time on existing hardware, there are a variety of options. The algorithm being used can be improved, for example. It is (almost) always most cost effective to ensure that the most efficient algorithm known is being used to solve the problem. Exceptions to this rule would include occasions where the job is only going to be run a limited number of times and the development effort (including fixing all the bugs) would outweigh the time saved.

Assuming that the most efficient algorithm is already being used, there's also then the simple option of purchasing a faster CPU. This option does not scale very well because there is a firm limit on the fastest available commodity CPU (currently around 3-4GHz for x86).

The next option is to buy a multiple CPU (symmetric multiprocessing, or SMP) machine. This is quite an expensive option and, again, there is a hard limit of how fast you can go using commodity hardware. x86-based machines also tend to be available only up to four-way. You can go faster if you go for more specialised server hardware, such as Xenon or PPC machines, and these are typically available in 32-, 64-, or even 128-way configurations. But things are starting to look expensive...

Of course, one option is to buy a specialist supercomputer. But now things are getting *very* expensive! There's another issue here – such machines typically use a proprietary OS with all the inherent negative aspects this brings.

HPC CHARACTERISTICS

A high performance cluster has the following desirable characteristics: firstly, it's cost effective – by using commodity parts, the cost/processing power can be kept low; it's also scalable – an attractive feature of clusters. A 10-node cluster, for example, can be created initially and then, if it is then decided that greater processing power is needed, more nodes can be added to the cluster without having to throw away the initial investment. Of great benefit here is the fact that clusters typically don't require the nodes to be identical. This means that as new CPUs become available and/or older CPUs become much cheaper, the cluster architect can add nodes in the most cost-efficient way for the circumstances.

HPC clusters are also more resilient to failures; because processing is spread across nodes, the risk of failure is also spread out. If one node of a 10-node cluster fails, the offending machine can be removed (although this may require manual intervention), and the cluster can be started running again very quickly. The cluster should then run at approximately 90% of full speed, assuming all the nodes are identical, whilst the broken node is repaired.

It's worth bearing in mind that HPCs also have undesirable characteristics. They're not 100% efficient because there are inherent inefficiencies in parallel processing schemes. This is particularly noticeable in clusters because they are usually interconnected with a relatively slow bus (typically 100/1000Mbit Ethernet). Therefore there is some loss of efficiency compared with some of the other solutions. This pans out in the following way: a single CPU running at 2GHz will most likely be considerably faster than an SMP machine with 2x1GHz processors. This SMP machine will, in turn, be faster than a two-node cluster with two 1GHz processors.

LOAD-BALANCING CLUSTERS ALLOW BUSINESSES TO MAXIMISE THE RETURN ON THEIR HARDWARE INVESTMENT BY ENSURING THE HARDWARE IS KEPT BUSY AS MUCH AS POSSIBLE

There are maintenance issues too. A cluster can be significantly more difficult (and therefore expensive) to maintain than a single machine. This is exhibited in terms of hardware and, more importantly, software. Often each node will run a copy of the OS, so installing OS upgrades and all-important security patches can become a serious concern on large clusters. This problem can be alleviated to a large extent by utilising diskless nodes which all boot from a single copy of the operating system. This allows the system administrator to upgrade/patch only one place and each of the nodes will pick up the changes next time they reboot.

The programming model also presents further difficulties. In order to make an application run on a high performance cluster, it typically needs to be split into sub-tasks which execute on individual nodes and communicate using an API such as MPI. Depending on the task in hand, this may require a lot of development and debugging effort.

CLUSTER IMPLEMENTATIONS

The most popular and certainly most well-known Linux HPC implementation is the Beowulf cluster. Rather than referring to a specific application or technology, a Beowulf cluster is a generic name referring to a cluster based upon the design laid down by NASA as part of the Beowulf Project. This started at NASA in 1994 as an effort to build a cluster computer from 16 Intel 386 DX4 processors using standard off-the-shelf components and running the Linux kernel.

The project tied together a number of existing technologies, including the message-passing APIs MPI and PVM, which allowed applications to be written which would execute in parallel on the nodes of the cluster.

In order to get the system working and improve performance, NASA engineers also wrote some code of their own, including making a few alterations to the Linux kernel such as a channel-bonding patch, which allowed the use of multiple Ethernet networks in parallel by having multiple network cards in each machine and a patch to allow a single global PID (process id) space.

THE BEOWULF PROJECT STARTED AT NASA IN 1994 AS AN EFFORT TO BUILD A CLUSTER COMPUTER FROM 16 INTEL 386 DX4 PROCESSORS USING STANDARD OFF-THE-SHELF COMPONENTS

For those interested in putting together a Beowulf cluster, the first port of call is www.beowulf.org. Once all the FAQs and HOWTOs from this site have been read, there are a number of decisions which need to be made.

One of the first will be the hardware configuration. This will depend greatly on whether existing hardware will be used or whether new hardware will be bought specifically for the job. In

addition, some hardware choices will depend on the performance requirements for the cluster. For instance, for a relatively small cluster, fast (100Mbit) Ethernet will probably suffice to connect the nodes. For larger clusters, or clusters which require a large throughput, faster connections such as Myrinet may be required.

Another decision to be made early on is the application architecture which is to be used, and there are two main choices here. Multiple instances of a single application is the easiest configuration, where the same application is run against different input files. This can be achieved relatively easily using a shell script and requires no application modification.

However, in most cases, the application will have to be written specifically to run on the cluster by splitting the task into subtasks which communicate using a message passing API. The two most common APIs are PVM (www.csm.ornl.gov/pvm/pvm_home.html) and MPI (www.lam-mpi.org or www-unix.mcs.anl.gov/mpi/mpich/). Both are available for a number of platforms, including Linux. A good comparison of PVM and MPI is available at www.csm.ornl.gov/pvm/PVMvsMPI.ps.

IN THE BALANCE

The goal for a load-balancing cluster is not usually to improve the performance of a single CPU-intensive application, but rather to balance the load of a number of applications across the cluster.

This leads to a more pleasant user experience as it increases the chances of applications getting serviced in a timely manner. For example, a company might have their cluster running a Web server, a database and a payroll system. The idea is that the CPU power of every node in the cluster is spread out over these tasks, so that if a complex database query is being run at a time when there is little website traffic, then the database will get a lot of CPU power. If site traffic suddenly picks up, the database performance will degrade slightly, and the cluster should smoothly give more CPU power to the Web server.

This enables much more efficient use of resources than having, say, three dedicated machines for each of these purposes, in which the most CPU power each application can receive is one third of the total 'available' power even if the other two other applications are idle (assuming identical nodes).

A highly desirable feature of load balancing is that if the company needs to increase the performance of the applications, they can add another machine, which will increase the performance of all the applications by equal amounts too. If they had used dedicated machines, the only way an increase in performance could be achieved is to buy lots of new machines which are faster and relegate the existing machines to doing something which requires less CPU power.

As you can see, the load-balancing cluster not only gets the most out of existing hardware, but it also protects hardware investment by allowing performance to be increased incrementally by adding new nodes without getting rid of old ones.

Load-balancing clusters are sometimes implemented using the workstations being used by individuals on their desks. For most workstation users, their computers spend the majority of time idle, waiting for the user to read their email, update the documents they are working on etc. By making all these machines into a load-balancing cluster, all these wasted CPU cycles can be harnessed to do real work for those who need it without having too much of a negative impact on the regular users. If a local user suddenly needs more cycles (by kicking off a compile for instance), the cluster will migrate the 'foreign' processes away from that machine until it becomes idle again. Load-balancing clusters constructed in this way are often referred to as COWs or NOWs (Cluster/Network of Workstations).

THE KERNEL WILL NOTICE THAT THE OTHER TWO NODES ARE NOT BEING USED AND WILL MIGRATE A PROCESS TO EACH OF THEM. THE THREE PROCESSES WILL THEN EXECUTE IN PARALLEL

LOAD OF LINUX

The most famous Linux load-balancing cluster implementation is Mosix. The Multicomputer Operating System for Unix (MOSIX) began as a research project at the Hebrew University of Jerusalem by Professor Amnon Barak. Original versions ran on various Unix machines, through BSD, Linux 2.2, and finally onto Linux 2.4, which is the OS from which the current release is available.

At the end of 2001/start of 2002, a member of the MOSIX team created a fork of MOSIX called OpenMosix (www.openmosix.org). Since that time, OpenMosix has been developed extensively and has had all MOSIX code rewritten so that it contains only GPL-licensed material.

OpenMosix consists of a number of patches to the Linux kernel. These patches introduce a Pre-emptive Process Migration (PPM) mechanism which allows processes to be migrated automatically between nodes. This migration enables processes to be moved from highly loaded nodes onto nodes which are less loaded, in order to spread the work throughout the cluster. As this is handled at the kernel level, it is transparent to the applications – a massive advantage over more intrusive methods.

Existing applications can be run on OpenMosix clusters without modification and will take advantage of load balancing. Another advantage of OpenMosix over other techniques is that it operates on a peer-to-peer basis, which allows nodes to be added and removed dynamically. Of course, it also means that there cannot be a single point of failure.

In addition to the process migration, OpenMosix also includes a filesystem called oMFS (OpenMosix File System) which gives a shared file system across all nodes of the cluster and includes an optimisation called Direct Filesystem Access (DFSA), which allows some file operations to take place on the local node rather than the home node when a process had been migrated.

For an example of how OpenMosix works in practice, consider an OpenMosix cluster of three 1GHz machines which is to be used to render some scenes using a ray trace package such as POVRay. If there are three scenes to render (we will assume they are of equal complexity for simplicity's sake), one node in the cluster is logged into and three instances of POVRay are launched in parallel, one operating on each of the three scenes. Note that this is the original POVRay application, not the PVM-patched version discussed in the box opposite. Initially the three processes will begin to execute on the logged-into node, but shortly thereafter, the kernel will notice that the other two nodes are not being used and will migrate a POVRay process to each of them. The three processes will then execute in parallel and the three scenes will be rendered in around the same time as a single scene would have been on a single machine (to put it another way, the user will see an approximate three-fold increase in speed over using a single machine).

A desirable feature of OpenMosix is that its load-balancing algorithms take the

REAL-WORLD EXAMPLES

A quick look through the latest list of the top 500 supercomputers (www.top500.org) reveals that many of the fastest computers in the world today are Linux clusters. This is helped in part by the number of popular applications which have been modified to execute on Beowulf clusters. As just one example, PVMRAY (http://pvmpov.sourceforge.net) is a patch for the popular POVRay ray tracer (www.povray.org), which enables scenes to be rendered in parallel on a cluster. There are a number of benchmarks available - www.haveland.com/index.htm?povbench and www.tabsnet.com - which highlight how successful this has been.

speed of each node into consideration. If a 3GHz machine were to be added into this cluster, then with six scenes rendered using the same method above, three would be migrated to the 3GHz machine, and one would be given to each of the 1GHz machines. That is to say that the load would be smoothly distributed across the nodes according to their power. This also works with SMP nodes – if a node were added which had 4x1GHz processors, it would get approximately four times the work of a 1GHz node.

The main limitation of OpenMosix is that processes which use a number of forbidden features will not be able to migrate to another node. These features include writeable shared memory, real-time scheduling, multi-threading and direct manipulation of I/O devices.

HIGH AVAILABILITY

In contrast, high availability clusters are all about reliability. In these times of increasing reliance by companies on computers to perform their business, reliability is an increasingly hot topic. Every second that a company's ordering system is offline, they can't sell their products to their customers. This will cost them money, particularly if customers then go to one of their competitors whose computers *are* working!

Usually, HA clusters consist of two machines (Master and the Slave) with identical hardware configurations. The Master machine is the one performing the work and the Slave machine sits idle. Any changes to the Master's disk(s) are mirrored over to the equivalent disk on the Slave system. There is some form of 'heartbeat' between the systems, sent from the Master to the Slave, to tell it that everything is OK. The Slave machine monitors this Heartbeat, waiting to spring into action the instant anything goes wrong with the Master. If the Slave detects any problems with the Master then it takes over its services with little (ideally no) interruption.

Refinements to this scheme include the Slave machine only taking over the particular services which the Master is having trouble with and having more than two machines. The main downside of this scheme is that you have to buy twice as much computing power as you actually need and half of it will likely be unused at any given time.

LOAD-BALANCING CLUSTERS ARE SOMETIMES IMPLEMENTED USING THE WORKSTATIONS BEING USED BY INDIVIDUALS ON THEIR DESKS

The Linux-HA project (http://linux-ha.org) aims to implement a high availability cluster on Linux. The project mainly consists of an application called 'heartbeat'. As the name suggests, the primary function of heartbeat is to send 'heartbeat packets' back and forth between two or more cluster nodes. This heartbeat basically informs the other node(s) that this node is still alive and healthy. The idea is that if we stop receiving heartbeats from a node, we can take over the duties of that node in an effort to keep the service available.

This process is known as failover. When (or if) the original node becomes available once more, it can take over providing the service once more, and this process is known as failback. In order to facilitate this process, heartbeat includes the facility to migrate IP addresses in the event of failover, so that if node A fails, all clients can continue to use the same IP address but with heartbeat ensuring that the requests go to node B instead.

THIS GIVES A SOPHISTICATED SETUP WHICH WILL NOTICE HARDWARE PROBLEMS, SUCH AS A NODE CRASHING OR SUFFERING FROM A POWER FAILURE

Heartbeat can be configured to communicate via a number of methods. For a small cluster, where all the nodes are close together, such as in the same room, a good option is to connect the nodes via the serial port. This is a cheap, fast and reliable option, assuming the nodes actually have serial ports! For a larger cluster, or where the nodes are more widely dispersed than a single room, other options such as shared/private Ethernet can be used.

For some simple HA setups, heartbeat can be sufficient, but there are a number of other facilities available for the more demanding HA cluster designer. One of the limitations of heartbeat is that it will only notice if the whole machine goes down (or rather the heartbeat application). But what if the node itself carries on working and one of the services it is providing fails (such as the Web server)?

A desirable addition, therefore, is a service monitor daemon such as mon (www.kernel.org/software/mon/). Mon is an extensible program which has two main functions – monitoring, provided by plugins which are written for mon to repeatedly test for a condition (for instance, that a Web server is still serving pages); and actions, again provided by plugins. Actions are carried out according to the result of one or more tests from the monitoring phase. They can be as simple as sending an email or a text message to an administrator alerting them that there is a problem, although they can even attempt to fix/recover from the problem.

A popular configuration is to have mon running on an active node checking that its services are running correctly. In the event of a problem being discovered, mon is configured to gracefully shut down heartbeat. This will cause one of the other nodes to notice that the machine is in difficulty and take over the problem node's duties.

This gives a sophisticated setup which will notice hardware problems (such as a node crashing or suffering from a power failure) and software problems (such as the Web server crashing). This is fine for systems which are serving up static content, because the data on the failing node and the node which takes over will both be the same.

A more troublesome application, however, is one which has dynamic data which is being constantly updated (ie from user input – a message-board-type application for instance). We don't want to lose any of our data when failover takes place!

There are a number of solutions for this final problem, ranging from expensive hardware solutions like specialised RAID arrays which multiple computers can read from/write to simultaneously, through to software solutions such as coda (http://www.coda.cs.cmu.edu/) or DRBD (http://www.drbd.org/). By utilising one of these technologies, data can be kept in sync between nodes so that when failover takes place, the most up-to-date information is available on the new node.

FURTHER READING

Every month Shobanna Patel and David Goodwin of Open Minds High Availability Solutions write about clustering technology in the Developer section of *LinuxUser & Developer*. This is available in the Technical Edition of the magazine which is available via paid-for subscription or on the newsstand. For more information about how to get hold of this edition of the magazine, see page 64. For this month's instalment, readers of the Technical Edition should turn to page 84.

KEY LINKS

Beowulf: www.beowulf.org
PVM: www.csm.ornl.gov/pvm/pvm_home.html
MPI: www.lam-mpi.org
www-unix.mcs.anl.gov/mpi/mpich/
Supercomputers list: www.top500.org
OpenMosix: www.openmosix.org
Linux-HA project: http://linux-ha.org
mon: www.kernel.org/software/mon/
coda: www.coda.cs.cmu.edu
DRBD: www.drbd.org

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Pushing the advantage

Jono Bacon takes a look at a pioneering organisation in Birmingham that aims to take Open Source software to the corporate masses

Open Source and Free Software are two concepts that rely on two core principles: community and technology. Readers of *LinuxUser & Developer* will no doubt be more than familiar with the benefits of a community-driven software model. The big players, such as IBM, Sun, Novell, HP and Red Hat, have committed themselves to finding a common ground with the community in order to work together and expand the Linux offering for business.

Business end-user take-up is a key area in which many people want to see Linux expand. Back in the late Nineties, when companies such as Red Hat, SUSE and Mandrake were trying to persuade the world that the Linux and Open Source platform was a viable option, demand was steadily rising. Since those heady days, some huge players have entered the market and made Open Source a truly viable platform not only for business but, potentially, consumer markets.

In addition to the general commercialisation of Linux and Open Source, the mainframe-buying enterprise masses have wandered into the scope of these businesses and become a core target. The Small and Medium sizes Enterprise (SME) sector has become even more critical. Businesses with small numbers of employees and tight budget margins for IT are becoming increasingly interested in Linux. The mere concept that this software can make for a more efficient IT solution and actually cost less money to implement is an attractive formula.

With the increasing viability of the Linux and Open Source platform, various other supplemental organisations have been set up to push the cause. These organisations revolve around different aspects and priorities, and typically focus on different core objectives. Examples of such groups include the Association for Free Software (AFFS; www.affs.org.uk), which focuses on Free Software, OpenForum Europe (www.openforumeurope.org), which focuses on business adoption, and worldwide organisations such as the Free Software Foundation (FSF; www.fsf.org).

ALWAYS OPEN

One such group that has materialised is the Open Advantage organisation, based in Birmingham, in the UK's West Midlands. Open Advantage was created by Paul Cooper and Scott Thompson, who wanted to make a practical difference to the take-up of Open Source in the West Midlands, an area traditionally dominated by industrial manufacturing. The project is a collaboration between the University of Central England (UCE), the National Business to Business Centre (NB2BC) at Warwick University, and the National Computing Centre (NCC) based in Manchester.

Paul and Scott initially worked together to flesh out a plan of exactly what Open Advantage would achieve and how it would be paid for. Funding was obtained from the UCE, Advantage West Midlands and the NCC, and the Open Advantage centre opened up in Birmingham on Friday, 19 March 2004. We went along to the opening event to see what Open Advantage was planning in its advocacy and the centre to be a professional, corporate-style establishment, containing discussion areas, offices and, critically, a computer lab that had a network of different Linux distributions and desktops, as well a Windows and Mac OS X machine.

It was evident from the literature and discussions that this room was going to be a core focus when demonstrating Open Source software and giving a practical view of what's on offer. It was also evident that the Windows and Mac OS X machines were there to demonstrate how Open Source can integrate with alien systems such as these. This well-presented hotbed of technology was powered by a server room on the floor above that was filled with rack-mounted computers and cooling equipment.

Aside from the opening-day razzmatazz, complete with buffet and enthusiastic politician, there's no doubt that Open Advantage has a set of well-reasoned motives and plans for helping push Open Source in the Midlands.

UCE Birmingham | open advantage
WEST MIDLANDS OPEN SOURCE SOLUTION CENTRE

LEARNING MORE

Despite this good start, we were left with a strong desire to learn more and find out the specifics. There are, after all, many organisations that seek to set out and help push Open Source, but many fail due to lack of funding or interest. Open Advantage might have been making all the right sounds, but we wanted to ask them how exactly they planned to rise above those who have failed in the past. To this end, we spoke with Paul Cooper and Scott Thompson to find out the specifics of where this potentially trend-setting scheme is going.

Scott started by explaining that the key objectives of the scheme are to promote, encourage, and assist organisations in the adoption of Open Source technologies, whether it's within schools, businesses, or any other organisation.

"The first task is simply to raise awareness of Open Source

"THE FIRST TASK IS SIMPLY TO RAISE AWARENESS OF OPEN SOURCE SOFTWARE"
SCOTT THOMPSON

software," he continued. "What it is, where it's used, and so on. The second level is, as interest develops, in helping people gain a deeper understanding of whatever aspect of Open Source interests them, whether it is licensing, methodology, community, or technology. Often this also involves calming fears about support, quality, longevity, legality – the typical FUD menu of concerns. Finally, we can offer a certain amount of direct assistance, which could be researching a range of Open Source solutions for particular requirements, providing resources to help develop an Open Source solution or service, or assisting with deployment of an Open Source solution."

However, Open Advantage itself has loftier ideals and the project is aiming for the stars: "[we want] to become a centre of excellence," Scott said. "This involves developing the expertise and staff in the centre, providing demonstrators of Open Source solutions, and trying to network (in the human sense) with everyone involved in Open Source in the West Midlands."

He adds, almost as a footnote: "I'm sure there are many hidden pockets of Open Source activity all around the region that we don't know about." He invites any such individuals or groups to get in touch with him by email at info@open advantage.org.

This seems an interesting direction to take. To advise people on the issues of Open Source and demonstrate the products of Open Source would be considered honourable by anybody. However, even the most honourable intentions need to be paid for, as well as sourced and justified. So how is this achieved?

"We're funded by Advantage West Midlands [AWM]," Scott explained, "who are the regional development agency for the West Midlands."

But if Open Advantage is supported by AWM, the UCE, Warwick University, and the NCC, what do they all aim to get out of the scheme?

"For AWM, the reason for funding our project, or indeed any project, is the potential to deliver economic benefit to the region," says Scott. "AWM had the vision to recognise that Open Source software provides an opportunity for West Midlands organisations to gain access to cost-effective IT solutions." He continues: "For the UCE and Warwick University, being involved in the first Open Source solution centre in the UK brings a great deal of kudos and enhances their reputations as forward-thinking institutions. However, the most important benefit is the knowledge exchange with the wider community – sharing the knowledge and experience from within the project and the Universities, and getting back a great deal of 'real world' knowledge and experience from the organisations we assist."

The NCC published a report in 2002 called *Open Source – The UK Opportunity*. Scott and Paul gain from the project what was laid out in that manifesto, which was published when they were planning Open Advantage.

BUSINESS END-USER TAKE-UP IS A KEY AREA IN WHICH MANY PEOPLE WANT TO SEE LINUX EXPAND

However, although current funding might be sorted, what about the future? Paul steps in with some examples of the centre's work by way of an answer: "The main targets for the project are broken down as follows: to develop a seminar and workshop programme that attracts 1,000 attendees over the life of the project; to assist 400 organisations; to provide 100 learning opportunities (this is 'funding speak' that means a training course); and assist four community initiatives, such as our work with BVSC [Birmingham Voluntary Service Council, discussed below]."

Scott adds: "There's no question that the targets we've set are ambitious. So far we're exactly on target with the progress we've set in our project plan, despite being slightly behind in getting our office and demo lab set up. We'll be ramping up our activities over the next six months and will be looking for more staff shortly."

In fact, he invites readers to keep an eye on the project's website if they're interested in vacancies. But he adds: "We're completely confident that we'll hit all of our targets."

A point of particular interest is that Open Advantage has measurable objectives. Although critics often feel such schemes are simply cash cows to secure bigger and better funding for other fat-cat schemes, it does seem that the team has very real and pragmatic goals. Assisting 400 organisations is a considerable contribution to not only helping businesses improve their IT, but also pushing the cause for Open Source. It is also good to see that training is a core part of the outlook, alongside community initiatives. Exactly how these goals are accomplished is yet to be determined but, nonetheless, clarity of operation is always a good thing.

Of course, a potential problem is that there are many other schemes like Open Advantage that are working to help spread Open Source and/or Free Software awareness. But there is a key conceptual difference between Open Source and Free Software: does this allow Open Advantage to bring something new to the table?

"We have a passionate, committed team, dedicated to helping people get into Open Source," replies Scott.

But does the organisation have plans to share some resources and communications with other groups, such as the AFFS, OpenForum Europe and the FSF?

"We are members of OpenForum Europe," says Scott, "and we jointly organised and staffed the Business Advice Centre at the recent LinuxUser & Developer show. There are a number of other projects in the works that we are jointly developing. We've also had a meeting with Marc Eberhard and Ian Lynch of the AFFS on projects we have a joint interest in. We'll also have a stand at the AFFS annual conference. We've also worked with other West Midlands projects such as

The Open Advantage building includes a lab in which Open Source solutions can be demonstrated

iCentrum and Cercia. We're happy to work with any group or organisation with complementary goals and we try to supplement rather than duplicate the work they are already doing."

But how can Open Advantage realistically penetrate business markets that are typically left out of the pro-Linux advocacy effort? Scott replies with a concise and perhaps surprising answer.

"We don't see Open Advantage as a pro-Linux advocacy effort. We aim to give impartial advice about Open Source software as a whole, much of which is regarding operating systems. There are many individuals and groups (such as LUGs) successfully advocating Open Source in various business markets. We'll be supplementing this by trying to approach business through the organisations they often turn to for support, such as IT associations, business links, chambers of commerce, business publications, and local IT support and development vendors."

Which organisations has Open Advantage helped so far? What is the extent of its assistance?

Paul answers: "We've assisted a wide range of organisations, from independent consultants to property management companies to software development companies. In May we're working with Birmingham Voluntary Services Council (www.bvsc.org) and the NCC on a project to put PCs with Linux and Open Source software into around 20 voluntary groups."

Part of the strength of Open Advantage is its business-like team of professionals who are also Open Source advocates

HELP!

Paul goes on to detail how they help an organisation: "How we help an organisation varies. For organisations looking for a generic product type, for example, along the lines of, 'Are there any Open Source Web-based groupware systems?', we can research some options and then install these on our demo servers for them to evaluate.

"Right now we're helping two companies with more or less that question. Their individual requirements are different but they are both looking for Web-based groupware. Of course, sometimes the answer to a generic product request might be that there aren't any Open Source equivalents or the result of the evaluation might be that the Open Source solution is not as mature as other proprietary options. However, whatever the outcome, the results are valuable to the organisation. It's a low-effort, low-risk way to try out Open Source."

"THE EXTRA RESOURCES AND EXPERIENCE OF OUR PROJECT GIVES ORGANISATIONS A FAST-TRACK INTO THE WORLD OF OPEN SOURCE SOFTWARE"
PAUL COOPER

Paul explains that the centre offers different things to different people. Some might use the centre as a demo lab for testing or benchmarking Open Source solutions, whilst IT companies might make use of the consultation on offer and the advice provided regarding questions of development methodology, licensing choices, and business models.

"Some organisations might be interested in using Open Source, but be hampered by the need for training," says Paul. "The lack of suitable courses is also a hindrance. Where their needs match our skill sets then we can provide some training to help them get to grips with Open Source."

It seems interesting that Open Advantage has already targeted some volunteer organisations, because the language and tone of Open Advantage correspondence and its website seem very business orientated and less community orientated. How much of its resources are earmarked for charities and other groups? Can they genuinely reach the proposed 20 volunteer groups?

"At this point, I have no idea which groups we will be assisting," says Paul. "That side of things is handled by BVSC: they have an excellent training course that gives staff in charities and voluntary groups the tools to determine an IT strategy for their organisation. We are helping BVSC IT staff integrate Open Source tools into their course: they had already thought about using Open Source but, like everyone, they had little time to look at it in detail. The extra resources and experience of our project gives them a fast-track into the world of Open Source software."

Although it seems clear that businesses are high on the agenda, what opportunities will Open Advantage make available for contractors that deal with Open Source?

"We can help freelancers, sole traders, and consultants in the same ways we help businesses," replies Paul. "We've already worked with a couple of independent consultants/freelancers."

CRITICAL APPRAISAL

Many groups like Open Advantage have been supported by commercial vendors. Critics have typically cited such arrangements as being behind-the-scenes mechanisms for generating revenue. Although Open Advantage is supported by organisations wishing to improve prosperity and IT education in the West Midlands, it has clearly stated it is vendor neutral. But how can advice be given that is truly vendor neutral?

Scott replies: "Our general approach is to offer, wherever possible, a range of solutions from a range of sources, which could be vendors but equally could be directly from an Open Source group or project. Since we aren't sponsored by any vendors, we aren't under any pressure to promote one vendor over others or other sources. We try to provide all the facilities and help we can to allow our clients to make the choices themselves."

So how is the best Open Source solution determined?

Paul takes the reins: "As Scott said, we supply the resources and support to allow our clients to determine the best solution for their requirements. For some clients, the best solution may be purely Open Source, purely proprietary or a mix of Open Source and proprietary systems."

The organisation hasn't been working with any companies in particular to help run the Open Advantage project, Scott continues, and is entirely self contained within the UCE, NB2BC, and NCC.

The centre in Birmingham has a lab filled with Linux-based

machines that demonstrate different aspects of the software. But how exactly will it be used to help push Open Source in the area?

"The demo lab can provide Apple OS X, Microsoft Windows XP, Linux (just about whatever distro you want), BSD, thin clients, and more or less any combination of these both as servers and clients," replies Paul. "We believe that one of the best ways to help people adopt Open Source software is to provide the facilities for them to sit down and try it out. Once people can find out first hand that most Open Source software works just like the software they're used to, is stable, interoperable, fully featured, and easy to use, then most of their initial objections fade away. The demo lab and the staff that support it provide organisations with a low-risk, low-effort way to try out Open Source software on a wide range of hardware and operations system combinations."

GROWTH

It's clear that Open Advantage has some real potential, but how will it grow and expand in the future?

"Our main focus at the moment is to deliver the project targets as required by our funding body," replies Scott. "Our aim beyond the initial funded period is to become the focal point in the UK for Open Source. We have begun planning how we will achieve this. For example, we hope to find further sources of funding within the UK and EU, or spin out as a not-for-profit organisation. At this stage we're keeping our options open, but we'll continue to develop our strategy over the next 6-12 months as the project and Open Source market develops."

Do either Scott or Paul feel that Open Advantage will pave the way for similar schemes to be set up in other parts of the UK?

"We hope that projects like Open Advantage will be developed across the UK," says Scott, "and we're willing to share our experience and lend our support to anyone trying to develop projects. Other projects have sprung up independently. JISC [the Joint Information Systems Committee] is already funding the OSS [Open Source Software] Watch project based in Oxford University, which has broadly similar aims to us but focuses on HE and FE institutions, and there are a couple of related projects around the EU."

There is little doubt that the Open Advantage scheme sounds like a great opportunity for getting Open Source better integrated into the West Midlands. One of the many problems with any form of advocacy, and particularly that of computer-based systems, is the challenge of representing something that may be uninteresting to many people in an interesting way. Although the software that drives the Linux community is fascinating to readers of this magazine, it may be less interesting to the average business that simply wants to cut costs and increase stability. Many small businesses simply do not have the resources to employ someone to be interested in their IT strategy and the interest must stem from the originators of the business, whose priorities might lie in other areas.

The lab is backed-up by a hefty server room, packed full of top-of-the-range hardware systems

"BEING INVOLVED IN THE FIRST OPEN SOURCE SOLUTION CENTRE IN THE UK BRINGS A GREAT DEAL OF KUDOS"
SCOTT THOMPSON

POTENTIAL

Where the Open Advantage scheme appears to show potential and merit is in the way that it is approaching the problem. There is clearly real measurable potential. Many schemes that are set up to improve the take-up of Open Source and Free Software are typically launched with great fanfare and promise, but steadily evolve into nothing more than a discussion forum for like-minded advocates and offer little of practical value. With the Open Advantage scheme, however, Scott and Paul have set forth to start as they mean to go on. This has involved sourcing premises, paying wages, setting targets and creating resources. Many similar schemes are simply side projects to the daily lifestyles and family commitments of their participants. Open Advantage is different and is a full-time scheme employed by full-time employees. This fact alone brings the potential of the scheme up to a new level.

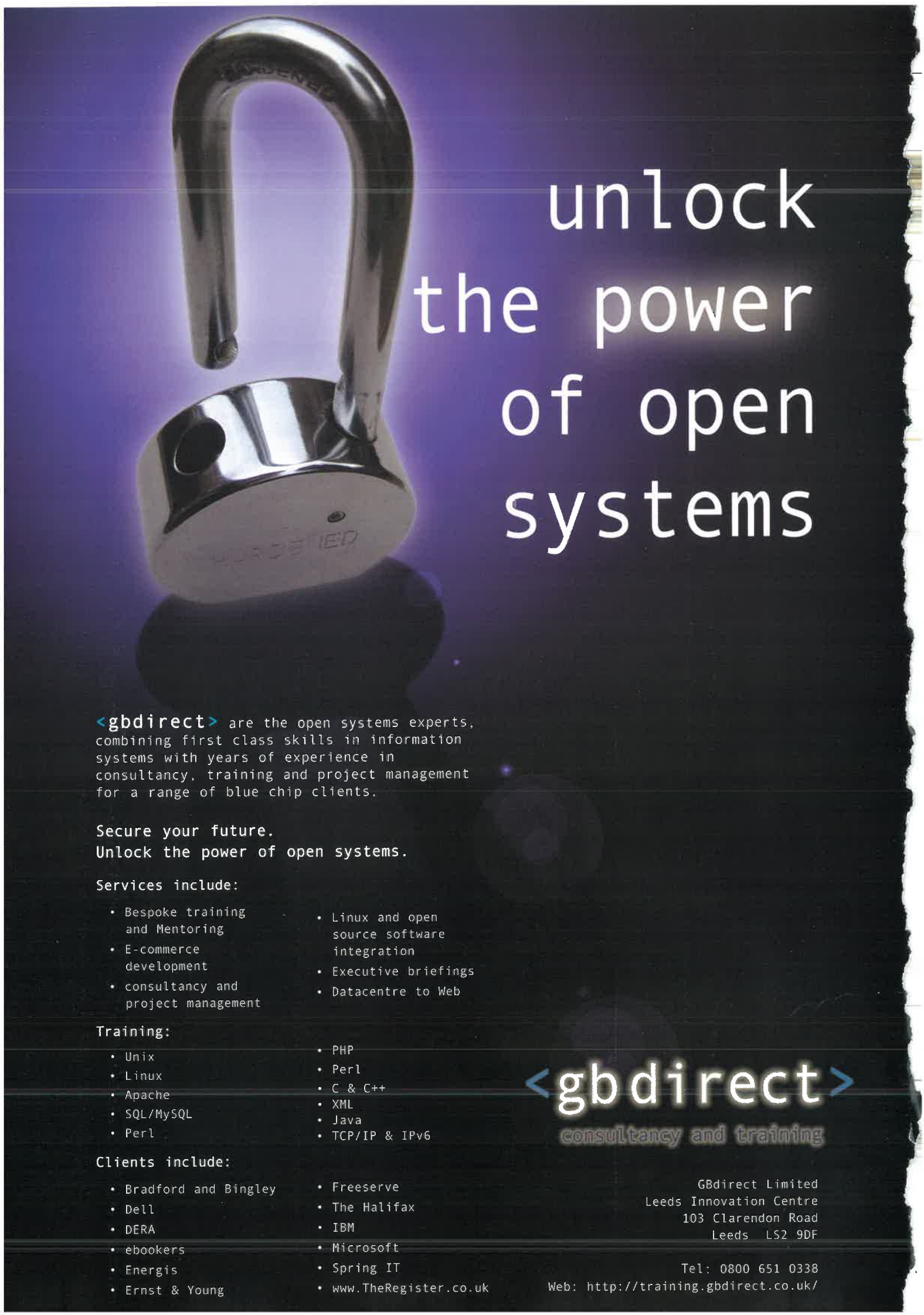
There is no doubt that there are risks involved. Schemes such as this have clear targets and goals that must be achieved to secure further funding and investment. The goals discussed by Scott and Paul are clearly dependent on a real and tangible take-up of Open Source in the West Midlands. Although this sounds reasonable, particularly with the increasing use of Linux, the challenge lies not with the take-up but how the potential clients are sourced: while Open Advantage is quite clearly advertised as a centre of excellence that businesses can use to find help on how to move over to Open Source systems, there perhaps needs to be an even greater PR effort to make the centre known to the general local community. This also needs to include companies that do not centre their business around IT if it is to make a real impact across different business sectors.

One other area in which the Open Advantage scheme seems to have got a good balance is in the way it has approached the professionalism of the project. For too long, advocacy has been performed by over-technical people who wear penguin T-shirts and lack the communication skills to capture the interest of a business representative considering an Open Source platform. This kind of advocacy (backed up by the vendor-specific marketing of people such as Red Hat, IBM and Novell) is competing with the extravagant wining and dining that is commonly cited by businesses when Microsoft approaches them to use its products.

Open Advantage is definitely approaching Open Source marketing from a business perspective. In many ways, Open Advantage's approach versus that of the AFFS could be seen in terms of Eric Raymond versus Richard Stallman – they're individuals with similar goals but different perspectives.

KEY LINKS

Open Advantage:
www.open advantage.org
Birmingham Voluntary Services Council:
www.bvsc.org
Free Software Foundation:
www.fsf.org
AFFS:
www.affs.org.uk
National Computing Centre:
www.ncc.co.uk
National B2B Centre:
www.nb2bc.co.uk



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Patently wrong

Tom Chance provides a taste of our forthcoming coverage of the software patents debate with an account of how he helped defeat the previous EU vote

It's not every day that you find yourself talking to your MEP about Free Software. The day becomes even more unusual when an MEP's assistant starts to talk to you about happy penguins and GNU/Linux. But with a vote on software patents due in a matter of days, such strange circumstances go to the back of one's mind as one fights for the right to develop software free of patents.

A lot of coverage has been devoted to the software patents fracas, both in the USA and in the EU, and rightly so. But little is known about the lobbying process itself, nor about how individuals can and should approach it. This article attempts to redress the balance.

Getting to Brussels was a matter of boarding a plane, making our way to the European Parliament, calling up a hacker who was already inside the building, and waiting for a friendly MEP's assistant to allow us in. Once inside the building, we listened in on some briefings, looked through some more paperwork, and then set off to meet an MEP.

Our first target was Robert Sturdy MEP, a member of the UK Conservative Party, whose European coalition supports the legislation as it stands (at the time of writing). However, like many MEPs, he wasn't in the building on the day, so we made an appointment with his assistant. We met over a cup of coffee and began by trying to convince her that we had travelled to Brussels as individuals and wanted to express *our* concerns, not those of an organisation that had sent us over. Though the FFII (Foundation for a Free Information Infrastructure) had financed our trip, and we agreed with their views, MEPs are regularly lobbied by paid professionals and are less likely to take heed of your personal concerns if they think you're such a lobbyist.

I then launched into my semi-prepared speech about why software patents were bad for me, focusing on personal aspects of the issue and on aspects that touched Sturdy's own constituency (Cambridgeshire – a seat of software development in the UK). As we thrashed out arguments and deployed ever more convoluted analogies, we gradually got a feel for the kinds of arguments that the assistant responded to the most, and those that didn't impress her at all, and honed in on these points.

Frustratingly, accusations that the proposed legislation would lead to the havoc experienced in the US, with the infamous one-click patents, were of little use. Though it is often said that the proposed legislation brings the EU in line with US legislation, it is in fact the intention of the EU to avoid the mess that US legislation has created by clarifying the matter. However, whilst they claim to want to avoid patents on such 'inventions' as one-click shopping, the proposed legislation in fact legalises many such patents. Making this point became our first priority.

WE BEGAN BY TRYING TO CONVINCE HER THAT WE HAD TRAVELLED TO BRUSSELS AS INDIVIDUALS AND WANTED TO EXPRESS *OUR* CONCERNS, NOT THOSE OF AN ORGANISATION

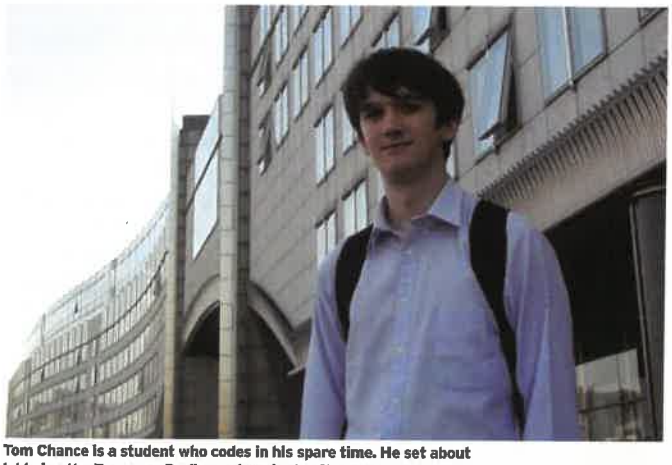
Once this point was established, we strove to make Sturdy's assistant understand why this was the case. As is widely documented, there is a difference between ideas based upon natural science that are manifested in physical inventions (eg a car, a pulley system) and ideas based upon theoretical sciences that are manifested in terms of information (eg music, software). Currently, EU legislation on patents precludes ideas based upon theoretical sciences, preferring protection by copyright, but software is a special case, because it can be part of an invention in the main based upon the physical sciences. For example, one might invent a new robot that assembles equipment; that robot will require software to work and current law does not make it clear whether or not the invention as a whole can be patented. The new EU law proposes, but fails to allow such an invention to be patented whilst not allowing software itself to be patented.

Trying to explain such a complicated, technical distinction to an MEP's assistant who specialises in agriculture was a struggle. Happily the assistant was friendly and fun to talk with, and gave us 45 minutes of her time. This came as quite a surprise, given that we had arrived unannounced to talk about an issue that she only had a short time to prepare herself for.

Reactions to this point varied. Sturdy's assistant broadly agreed with us, once she understood our point, but she thought that the legislation could avoid the problem by defining a category of unpatentable inventions that would include pure software. Our approach was to make this distinction in the core of the legislation to avoid confusion, but it seems that MEPs are more comfortable cleaning the legislation's uncertainties up afterwards in footnotes.

The final point that we drove home was that software patents are damaging. This was the hardest of all the arguments to make, because it depends upon an understanding of how software development differs from the development of cars, for example.

With each MEP we saw, and each assistant, we developed a more coherent, streamlined approach. The first meeting was an amusing chat that took 45 minutes. By the last MEP, we were able to make our points within about 20 minutes. Reactions from MEPs and assistants were more consistent, however. Few really understood the issue of software patents; some openly admitted that they were confused by the whole issue and were grateful that we had clarified it for them. None understood the nature of software development nor the views of software developers themselves. There was and still is plenty of work to be done.



Tom Chance is a student who codes in his spare time. He set about lobbying the European Parliament against software patents

Getting certified the LPI way

Dave Fisher presents his regular column in which he examines issues surrounding training and certification for those interested in Linux and Open Source

In the last issue I argued that Linux certification was not a universal panacea. I also suggested that an ideal certification scheme would be independent of all distributors/vendors (including the vendors of certification schemes), and be backed by some form of public authority.

Although public schemes are beginning to emerge in the Far East, the nearest thing in the UK is a degree of distribution and vendor neutrality through the Linux Professional Institute's LPIC programme.

This article looks at some practical strengths and weaknesses of the LPI and LPIC, before suggesting some tactical issues that prospective LPI candidates need to address. In the next issue, I'll look at Red Hat's RHCE, RHCT, and others.

NPO LPI

The Linux Professional Institute (LPI) is an international not-for-profit organisation headquartered in Toronto, with test centres, affiliates and widespread recognition throughout the world (most recently it offered certification examinations at the LinuxUser & Developer Expo 2004 in April this year).

Its Linux Professional Institute Certification Program (LPIC) has three levels – Junior Level Administration (LPIC1), Intermediate Level Administration (LPIC2), and Senior Level Administration (LPIC3). At each level you have to pass two exams to get the certificate. The LPI describes itself as a vendor-neutral organisation and all the LPIC exams aim to be distribution neutral – they must test knowledge that applies to all Linux systems.

Vendor and distribution neutrality is surprisingly difficult to achieve in practice. Given the obstacles, the LPI makes an admirable attempt. The LPI depends on support (via sponsorship, approval programmes, etc) from companies like IBM, HP, Novell, SUSE and SGI. Notable omissions from this list are companies with competing certification programmes or single-vendor support schemes, such as Red Hat, Sun Microsystems, Oracle and Dell.

While one would expect the organisation's sponsors to have some influence, I have yet to spot any evidence of significant bias for or against particular vendors, including competitors like Red Hat. By resisting the temptation to sell its own services (eg training, testing and so on), LPI also avoids several other potential sources of bias.

The LPIC exams go to some length to avoid favouring any particular distribution. Such biases as there are can largely be explained by the necessity of selection, such as the need to exclude topics from a potentially infinite list. An obvious example is the entirely reasonable decision to cover only RPM, dpkg and source packaging. That said, distro-related dependency resolution tools like apt, yast or yum are largely glossed over, despite the fact some would argue they're more important than the package formats per se.

VENDOR AND DISTRIBUTION NEUTRALITY IS SURPRISINGLY DIFFICULT TO ACHIEVE IN PRACTICE

CANDIDATES FOR ANY LPI CERTIFICATE SHOULD START THEIR PREPARATION BY LOOKING AT THE DETAILED EXAM OBJECTIVES FOR THEIR LEVEL

NEUTRAL ZONE

Among the more serious limits that distribution neutrality puts on LPIC is the necessity of paper-based assessment and the exclusive focus on command line and text editor configuration. Although neither is entirely satisfactory, it's easiest to see why the LPI was compelled to limit itself to paper-based testing. Practical tests could be carried out on multiple and/or randomly selected live distributions, but I can't imagine how the LPI could offer such tests at a reasonable cost.

The tie-in between the LPI's paper-based tests and the requirement for candidates to memorise a vast quantity of command-line exotica is very contentious amongst training professionals (and, it has to be said, their candidates). My own take on this issue is that the absence of a comprehensive cross-distro GUI configuration toolset compels LPI to focus on the command line and hence necessitates some memorisation, but both the share quantity and the selection of material which must be memorised is questionable.

Skilled use of the command line and a powerful text editor (essentially emacs or vim) is a prerequisite for full mastery of Linux, even in a single distribution environment. That is not, however, the same thing as saying that encyclopaedic knowledge of command line options and config file syntax *should* be necessary for simple system administration tasks – the kind that junior (Level 1) system administrators usually deal with.

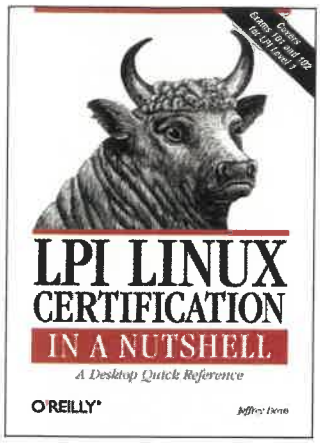
Indeed, there is a plausible argument for assigning the mnemonic tricks to reliable silicon memories while leaving humans to handle tasks requiring context knowledge and flexibility.

The absence of a comprehensive cross-platform configuration GUI is a problem for the

TM

Linux Professional Institute

Although currently revising its certification exams, LPI has come under significant fire for courses which require too encyclopaedic a knowledge of GNU tools



An industry has arisen around the tough LPI certification exams and preparation is vital, such as what's provided by this O'Reilly title

Linux community in general and not just the LPI. Nor is this merely an issue for 'dumb end-users'. Many experienced developers and administrators, who have mastered the command lines of several platforms, resent being forced to use the Linux CLI for tasks which suit a GUI better, such as selecting from complex lists of interdependent options in a subsystem that you may never re-configure from one year to the next. Busy and talented people have better things to do with their time than learning and memorising the options, arguments, syntax and config file formats for every one of the thousands of tools on a typical Linux system. A thorough understanding of the fundamental principles and a command of Linux's myriad documentation subsystems is vastly more important.

MANY EXPERIENCED DEVELOPERS AND ADMINISTRATORS RESENT BEING FORCED TO USE THE LINUX CLI FOR TASKS WHICH SUIT A GUI BETTER

ESOTERIC KNOWLEDGE

A determined critic will find several bits of esoteric and/or outdated knowledge that LPI requires its candidates to know. Two that spring to mind from Level 1 are the jurassic od command, and the long-outdated Bind 4 DNS configuration. Annoying as they are, these rare examples concern me less than the shear quantity of knowledge required.

When my company is recruiting, the body of knowledge that a candidate holds in his/her head comes a long way down our list of technical requirements. Experience, an understanding of underlying principles, problem solving and general intelligence are what we look for first in a Linux professional. With these, globs of knowledge can be looked up or learnt as required.

THAT IS NOT THE SAME AS SAYING THAT ENCYCLOPAEDIC KNOWLEDGE OF COMMAND LINE OPTIONS AND CONFIG FILE SYNTAX SHOULD BE NECESSARY FOR SIMPLE SYSTEM ADMINISTRATION

Candidates for any LPI certificate should start their preparation by looking at the detailed exam objectives for their level (http://www.lpi.org/en/lpic.html). They will not only tell you what you need to know, but also the amount of depth/effort you need to put into particular topics, ie the weighted objectives effectively provide you with a study programme. Once you are confident of your knowledge, you can book an exam at centres all over the UK through https://www.lpi.org/en/register.html

How you prepare will depend on your background. Experienced Unix or Linux administrators should be able to pass the Level 1 LPI exams with minimal preparation, but will probably have to brush up on a few weak or under-utilised bits of knowledge for Level 2. Windows converts and relatively inexperienced Linux hobbyists will probably require a lot of preparation for Level 1 and may want to consider a formal training course. Experienced Windows sysadmins will find very little that is conceptually challenging at Level 1, but may struggle with the shear quantity of command line knowledge required.

The depth and quantity of knowledge required for each level excludes the possibility of most beginners moving directly from one to the next without a great deal of study and practice in between. Short instructor-led courses may help you get the big picture, but most people will need a lot of practice before and after to make good use of them.

KEY LINKS

LPI: www.lpi.org

Dave Fisher is currently Marketing Director of GBdirect Limited, a pioneer in Open Source training. David previously headed the company's training division, building on over 20 years' experience as a teacher, lecturer and examiner across a wide range of educational institutions.

LINUX TRAINING DIRECTORY

A selection of Linux training providers

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www.aqt.co.uk

Akemputing
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www.kemputing.net

B-Linux User Group
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lux-integ@b-vol.co.uk

blueU.com
01225 483 100
www.blueu.com

Griffin Software
+353 (0)1 462 2277
www.griffinsoft.com

Bracknell & Wokingham College
01344 460 200 x390
www.bracknell.ac.uk

Bromley College of Further and Higher Education
020 8295 7000 x7122
http://ce.bromley.ac.uk/linux

Cerco Training
0500 828 274 / 01270 626 300
www.cercotraining.co.uk

Computer Park
01536 417 155
www.computerpark.co.uk

Enterprise Management Consulting
020 8659 2000
www.emcuk.com

First Alternative Training
01636 893 673
www.firstalt.co.uk

First Technology Transfer
020 8669 0769
sales@ftt.co.uk

GBdirect
0800 651 0338
info@gbdirect.co.uk
http://training.gbdirect.co.uk

Hewlett-Packard
01344 363 311
www.hp.com/uk/education

ICS London
0800 587 6611
www.icslondon.com

IBM UK and Ireland
0845 758 1329
ibm.com/services/learning/uk

Ingenio
0777 6234 754 / 020 8381 4852
www.ingenio.co.uk

Jason Clifford Consulting
0870 746 0758
www.linuxconsultants.ltd.uk

Kingpin Linux
01732 866 989
www.kingpin-linux.com

Learning Tree International
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www.learningtree.co.uk

LinuxIT
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linuxit.com/training.html

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www.looksystems.co.uk

New Horizons
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sales@nhlondon.com

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www.openminds.co.uk

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StayAhead Training
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www.stayahead.com

thorNET
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www.train-linux.co.uk

TopQuark
01689 834 381
www.topquark.co.uk

Training Camp (UK)
08700 775 501
www.trainingcamp.co.uk/linuxuser

Unipalm
0870 443 9099
www.unipalm.co.uk

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01642 246 996
www.beginners.co.uk

Open For Business is all about how you can replace proprietary technologies with superior Open Source alternatives, thereby slashing costs, vastly improving speed and reliability and, perhaps even more importantly, allowing you to wrest back control of your IT infrastructure from the proprietary IT suppliers

LDAP made easy

This month's Open For Business column is the second in our LDAP mini-series. By the end of it, you'll know all about using directory services to make the administration of your network easier. This has the potential to replace every bit of proprietary software you may have in the network with better Open Source software, and we're also going to explain how to tie it all together.

Last month we covered what a directory is and hinted at what you could do with it. This month we will look at the creation of a single-user account base and single sign-on initially across all of your non-Windows systems (Linux, Solaris, MacOSX, FreeBSD, HP-UX, etc).

But first you need your LDAP directory.

BLESSED

The Open Source world is blessed with the simply fantastic OpenLDAP project. Led by Kurt Zeilenga – the author of most of the RFCs that define what LDAP is and how it works – the OpenLDAP server and related tools are one of our best-kept secrets. So it's about time we corrected that.

The OpenLDAP server is a full implementation of the LDAP definition and has such a vast range of features that are so technically wonderful we could go on forever. Let's conclude that it's lightning fast, superbly robust, and does everything you could ever need a directory server to do, without the simply obscene price tag the proprietary vendors seem to enjoy attaching to these things.

Of course, it's Open Source too, which gives it transparency, extensibility, unlimited customisation potential, and it's guaranteed to never deviate from LDAP's defining standards – unlike some Directory products we could actively mention.

So we've got our OpenLDAP server – let's get on with populating it. As mentioned last month, an LDAP Directory enables information about objects to be held in a tree-like organisational structure (a quick tip at this point – the structure you create to hold your users can be anything you like and we recommend you create one that reflects your organisational structure). You can then associate key pieces of information with these objects.

The objects we are interested in creating are users. If asked what your users consist of in IT terms, you'd probably mention the standard stuff – username, password, home directory, access to this, denied access to that, email account with an email address, and so on. In fact, take some time right now to jot all this down and you'll see that you can soon write a list of stuff defining what a user is on your particular network. So if we create an object in our directory that represents a user from the IT perspective, the attributes this object must have are those meaningful in an IT sense – and you've just listed them.

SOMETHING UNDERSTOOD

All this stuff is well understood and well thought through. A central notion in the LDAP world is that of 'schemas'. You've probably noticed by now that we like to explain complex stuff in simple terms and it's true that in real-life LDAP implementation there are a million and one subtleties. Our descriptions are not 'precise' in absolute terms but we'll leave that argument to the pedants – our descriptions are good enough for where we're going.

A schema is a big batch of definitions of well understood attributes – things like telephone numbers, email addresses and

THE OPENLDAP SERVER HAS SUCH A VAST RANGE OF FEATURES THAT ARE SO TECHNICALLY WONDERFUL WE COULD GO ON FOREVER

HANDS-ON HELP

It's worth remembering that there is a huge quantity of help online for whatever you're trying to do under Linux. A variety of HOWTO guides covering implementation of LDAP are available for all levels of user:

LDAP Linux HOWTO
www.tldp.org/HOWTO/LDAP-HOWTO/
Complete and detailed guide to installing, configuring and manipulating LDAP databases under Linux. Part of the Linux Documentation Project.

Samba-PDC LDAP HOW TO
www.unav.es/cti/ldap-smb-howto.html
Guide to using Samba's Primary Domain Controller together with LDAP.

Gentoo Linux OpenLDAP Authentication
www.gentoo.org/doc/en/ldap-howto.xml
Gentoo-specific guide to running OpenLDAP, which contains lots of background technical details.

LDAP HOWTO
http://howto.aphroland.de/HOWTO/LDAP/FrontPage
Guide to LDAP written from a Debian user's perspective, including interfacing with other common servers such as Postfix.

passwords. By registering a schema with your LDAP server you can then associate its definitions with your objects.

So we start by adding some schemas that represent people (our somewhat odd IT notion of what people look like that is!) and also that represent an account on a Unix box. You now have a basic directory service and you're ready to do something with it.

Now we need to move on to the boxes you want to authenticate to your shiny new Directory server. As mentioned, we're going to start with your Unix, Linux and BSD machines.

By default, these machines have a local account database (/etc/passwd) – a legacy from the early days of Unix. This database is sometimes exactly what you need but the truth is, in most cases, it's a nightmare to manage. Imagine a network of 500 servers, each with its own user database, each of which needs visiting every time a change happens in your user population...

Traditionally, Unix solved this with systems like NIS but this is not truly cross-platform in any trivial-to-implement way, and we want to do better than that, especially when we bring our Macs and Windows boxes online.

The answer is Pluggable Authentication Modules, affectionately known as PAM. The notion is simple – abstract the authentication layer so that your Unix system can be authenticated by any method which has a PAM module. PAM makes the method look like traditional Unix authentication. There are plenty of them, including MySQL, Radius, Kerberos and, for our purposes, LDAP.

PLEASING PAM

Once your LDAP PAM is plugged into your machine, you can authenticate the underlying operating system against your new Directory. One account base across all your Unix and Linux servers – how useful is that?

Not only that but FreeBSD has had PAM capabilities since release five, and since Mac OS X is based on a BSD core, it can participate in this scheme too. There's only one significant OS missing from your new account management paradise and you can guess what that is – a certain OS that relies on proprietary standards and constantly tries to define what you can do with it.

Don't worry, we're going to hit them next month! We'll show you how to extend your new Directory to enable logons to your Windows servers and desktops. These logons will be with exactly the same accounts you've just set up to enable logons to your Unix, Linux and BSD machines. Single identity across all your platforms – won't that be nice?

We'll do all this without you having to buy one of those ridiculously expensive directory solutions from one of the proprietary vendors – and we'll do it better. And that's because it's simply better software.

See you next month...

FREEBSD HAS HAD PAM CAPABILITIES SINCE RELEASE FIVE, AND SINCE MAC OS X IS BASED ON A BSD CORE, IT CAN PARTICIPATE IN THIS SCHEME TOO

Mark Taylor is a lead consultant with Sirius. An early and continuing contributor to a wide spectrum of Open Source development projects, Mark is actively working on wide-scale deployments of Open Source technologies in a variety of business environments.

Mark is happy to reply to specific questions or queries arising from Open For Business. He can be contacted at **mark.taylor@siriusit.co.uk**

Sirius has an area on its website containing useful supplementary material connected with this article. You will find technical details, HOWTOs, FAQs and hints & tips from the UK's leading Open Source deployment specialists at: **www.siriusit.co.uk/ofb/directoryservices/**

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Meccanics made easy

The Luddite opens up his box of Meccano pieces and finds the spirit of Free Software lingering among the nuts and bolts

When the world was young and easy, Britain had an Empire and steam still ruled the rails, and every well-scrubbed small boy had a Meccano set on his living room floor – a box of nuts and bolts, spanners, and bits of brass/tin/nickel plate with which a clever child (or parent) could build working steam engines, two-foot tall Eiffel towers or working looms, and reinvent the world.

With these tools every child could understand something about the technologies that made the world work, and see how the engines of industry turned. There was a monthly Meccano magazine filled with instructions and examples of working models, and a range of specialist sets for the young inventor to expand his or her possibilities, and build creative models with working gears and motors driven by steam, electricity or bits of string and pulleys.

"WHAT HOBBYIST CAN PUT THREE MAN-YEARS INTO PROGRAMMING, FINDING ALL BUGS, DOCUMENTING HIS PRODUCT, AND DISTRIBUTE FOR FREE?" BILL GATES

MADE EASY

Meccano, or "Meccanics Made Easy" (sic – quoting the advertising of the time), was invented in 1901 by Frank Hornby of Liverpool, and capitalised upon by a Mr Elliott, who was bought out in 1908. By 1914 there was a large factory in Binns Road, Liverpool, dedicated to making Meccano sets, and in latter years, manufacturing plants were built in New Jersey, France, Spain and Argentina.

Every young lad had a big red box – illustrated with a sketch of an archetypical pipe-smoking father who was oddly reminiscent of JR 'Bob' Dobbs of *Get Slack* and *Church of the Subgenius* fame – filled with bits of coloured tin plate, nuts and bolts, and if they were lucky, small working motors. But, by the tail end of the 1970s, Meccano was out of fashion, a relic of a past age, and a victim of the monetarist squeeze. Despite a sit-in by the workforce to keep the company going, the Liverpool factory was closed and Meccano, the toy that gave you an understanding of how basic mechanisms work, is no longer a familiar part of every British child's landscape – although Meccano sets are still manufactured by the original French subsidiary, and by Exacto Ltd of Buenos Aires in Argentina.

The virtue of Meccano, as with other classic educational toys, was that it gave the creative child (and pipe-smoking fathers) open access to the ideas and possibilities of the mechanical world, and an insight into how things worked in the wider world of industry. Such insights are often lacking in the modern world, where everything is computerised and resides in tiny pieces of silicon smaller than the eye can see, and the software that runs the computer is hidden from view. This not only deprives the intelligent child of the opportunity to understand and explore, but denies the right to a creative response to how things work; the next generation learn their lessons from an understanding of what has gone before, and play is as important as instruction in learning about what makes things tick.

"SAMBA IS THE EQUIVALENT OF A GARAGE BAND THAT MADE IT BIG" JEREMY ALLISON

Jeremy Allison of the Samba Team gives this as an argument for Open Source:

"I want anyone in the world to have the same opportunities that I had when I was growing up," he says. "The early Eighties was a period of intense creativity in the computer industry in Britain." It was the age of the Sinclair and the BBC Micro, when computing made easy for home use was replacing the kind of role that Meccano, 'The Eagle' and 'Look and Learn' had filled for past generations of British children.

"I had a Sinclair QL, which was a 32-bit machine, even though it had an 8-bit bus," continues Allison. The source of the operating system, QDOS, was included, perfectly legally, and "the assembly source, the commented source, you could buy and look at, and take apart and understand. It was burnt into ROM, but you could modify it – there was a company that had disassembled it for me, legally – and then along came the IBM PC and Microsoft, and crushed all the creativity out of it, just ground over it with a tank tread. So the kids growing up these days don't know any of that stuff. They don't know the basics, how the thing works. They've got black boxes that rattle because they're broken, and they can't look inside. You can't learn from that."

OPEN LETTER, CLOSED SOURCE

The signal for the change in the perception of software as a tool to be understood and tinkered with, to allow users a better understanding of the machines that they had paid for, was the

infamous "Open Letter to hobbyists" written by Bill Gates, "General Partner, Micro-Soft", and dated 3 February, 1976. Gates declares: "As the majority of hobbyists must be aware, most of you steal your software. Hardware must be paid for, but software is something to share. Who cares if the people who worked on it get paid?"

Gates continued, complaining that: "The royalty paid to us, the manual, the tape and the overhead make it a break-even operation," and asked forlornly: "Who can afford to do professional work for nothing? What hobbyist can put three man-years into programming, finding all bugs, documenting his product, and distribute for free?" Gates's question has been answered, more than adequately, by the thousands of programmers who have contributed to Free and Open Source software projects over the last 30 years.

By inventing the EULA and the concept of software in a box, Microsoft has moved from being a mere "break-even operation", if such it ever was, to being the richest corporation in the world, and remains unloved by hobbyists everywhere. Along with the misplaced apotheosis of Gates in the public imagination as the epitome of the unwashed geek, he is represented as the inventor of the world, the Internet and everything else touched by software. To the humble hobbyist, on a mission to understand how things work and how to make them work better, William Henry Gates III and the Microsoft Corporation are a triumph of marketing over experience. We want to get inside there, and see the code.

Increasingly desperate in its efforts to see off the new threat Linux poses to Microsoft's business model, Microsoft has turned to patents. The first shot across the bows is the FAT file system patent – "the immense intellectual effort that went into creating FAT," observes Allison. "I remember writing an implementation of FAT on the Sinclair QL back in 1986, so it isn't exactly rocket science. They're casting around for various strategies to try to stop Linux – the 'Open Source is Communism' message that they're trotting around the US Congress is another one. It may have no pull *outside* the US, but *in* the US it is going to have an immense effect. They know that they are not fighting a company – they're fighting a movement."

"YOUR DOOR KNOB WILL SOON BE COMPUTERISED, AND IF YOU CAN'T SEE THE SOURCE CODE FOR THAT, YOU WILL BECOME INCREASINGLY TRAPPED INSIDE A WORLD THAT YOU DON'T UNDERSTAND AND CAN'T CONTROL" JEREMY ALLISON

The irony is that the foundations that Microsoft's software is built on – the C programming language, the methodologies of operating systems and networks, the basic tools of computing that are the foundation upon which Microsoft built its proprietary layer – were created in an age when there was little concept of ownership of software. The few decades before the rise of Microsoft were an age of unprecedented pace of development because knowledge was shared and standards were established to smooth the path for innovation and experiment. The increasing stranglehold that patents, DRM and proprietary philosophies have on computing will inevitably stifle and slow this development. The claim of ownership to the basic ideas that make computing possible will kill competition.

BAND ON THE RUN

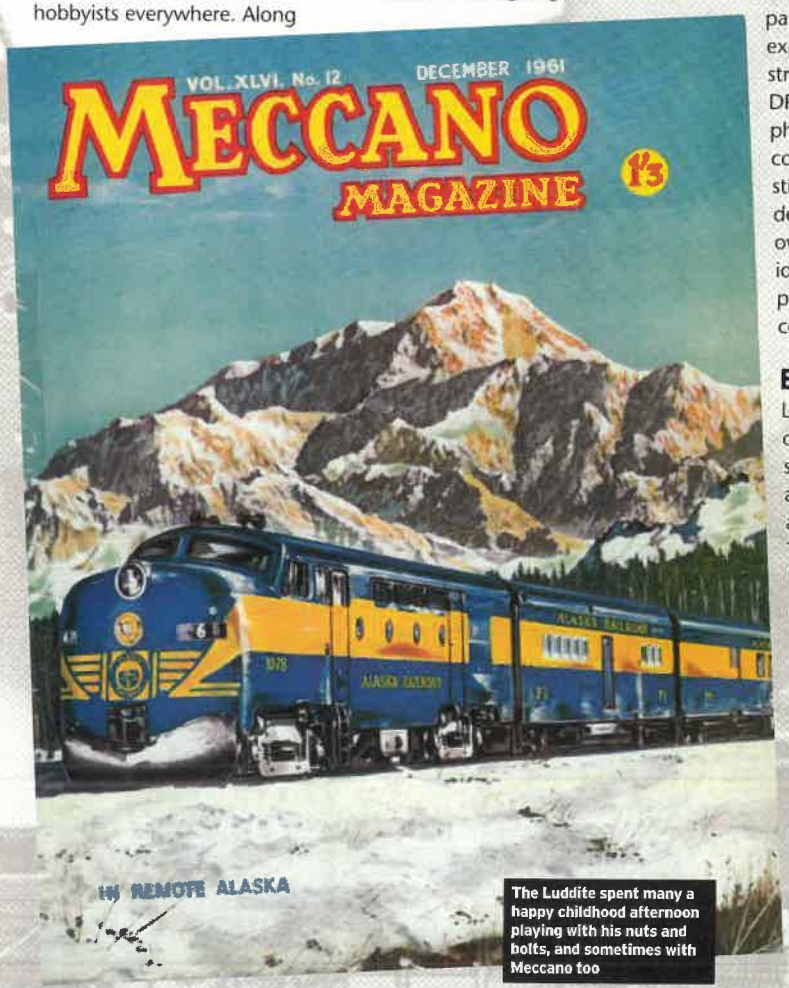
Linux arose from the opposite tradition, that sees software development as a learning experience, and as fun, or as Linus Torvalds expressed it in his original posting to comp.os.minix, "just a hobby, won't be big and professional like GNU".

Allison suggests another perspective: "People have always made music," he observes. "Once human beings had computers available, software became just like music. People create software the same way they create music – they really do. You don't do it because you get paid for it; you do it because it's fun. Samba is the equivalent of a garage band that made it big."

Increasingly, we live in a world where bits of software are buried in chips of silicon hidden around our lives, and we have little understanding of, or control over, what makes them tick or what they do. RFID tags, biometric identifiers and Java cards have the potential to follow and record our every move, and enter the accumulated knowledge into centralised databases, justified by the usual culprits, crime, security and terrorism, or the ubiquitous plea that: "If you haven't done anything wrong, why should you worry?"

Once upon a time we could all tinker inside our cars and hope to gain some understanding of how they work. But for the modern car, "tuning is dependent on software," says Allison, "and car manufacturers are refusing to release the access codes to anybody but authorised dealers. They are freezing out the third-party car repair market. This will happen with everything, and you will be trapped in a world where devices behave the way manufacturers want them to, and you don't really own anything you buy, because if it isn't connected to the network, it doesn't really work. Increasingly, stuff will work in ways that you may not like, but can do nothing about."

In the modern era everything is becoming computerised, and the code is closed to us. "Your door knob will soon be computerised", says Allison, "and if you can't see the source code for that, you will become increasingly trapped inside a world that you don't understand and can't control".



The Luddite spent many a happy childhood afternoon playing with his nuts and bolts, and sometimes with Meccano too

DISTRO

Gentoo Linux 2004.0

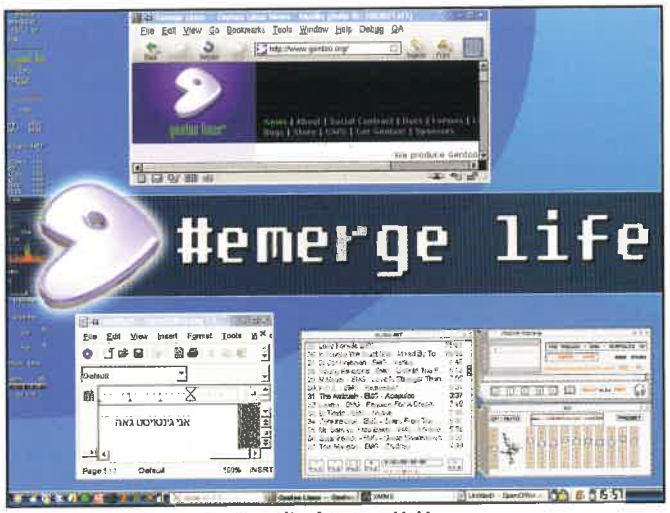
Hugely successful meta-distro offering cutting-edge core packages, superb documentation and a lively user community

Over the past two years Gentoo really does seem to have carved out a significant niche, well situated between more commercially orientated and perhaps rather impersonal distros, such as SUSE, and worthier, more community-based projects, such as Debian. Gentoo pools the best features from all manner of distro, with a decent emphasis on the politics of Free Software development sitting happily alongside excellent multimedia support, extreme usability and a good regard for essential security matters.

The Gentoo project is all about attention to detail, and the huge, vibrant user and developer community it has nurtured in recent years provides a perfect environment for such an approach. Gentoo Linux defines itself as a meta-distribution and recent developments, such as the Catalyst meta-tool, which premiers in this 2004.0 release, further contribute to the notion that the distro is best viewed as an environment for enhanced customisation and development of a powerful base distro.

Catalyst allows for complete customisation of all aspects of an installation, including generation of custom LiveCDs, sets of binaries, and portage trees. Alongside the usual updates to core packages such as GCC, GLIBC, KDE and GNOME, this latest release also targets a few more architectures. Most notable amongst these is an AMD64 release. Compatibility with a 2.6 series kernel is also ensured, and a good choice of patched and raw kernel sources can be selected at installation. A security-enhanced Gentoo platform, solely available for x86, has also been released as part of 2004.0.

Given that Gentoo possesses an extremely active developer community, with a good number of volunteers and staff undertaking management of specific packages and tasks, point releases are perhaps not so important as under other distros. Gentoo's emerge tool, which front-ends onto the whole portage package management system, allows for easy updating of packages on a daily if not hourly basis. This latest release does boast of a few userland changes, such as security-only package updating, and there are a handful of changes under the bonnet, but most of the core Gentoo system and install process is pretty much set in stone.



Gentoo is supported by a huge community of users worldwide

Much has always been made of Gentoo's tricky install process and many power users do try to warn off newbies. However, the latest install documentation, which has been consolidated into the Gentoo Linux Handbook, represents a totally thorough guide to all things Gentoo. More experienced users may be upset to find that the previously more manageable documentation has been expanded with plentiful background material, but a seriously concise quick install guide is readily available online.

Installation, a more or less completely manual affair, is attempted using a range of LiveCDs. The universal, bootable LiveCD is probably the easiest way to go, and a full portage tree, along with source for core packages, is included for those installing without network access. Further LiveCDs include a non-bootable GRP (Gentoo Reference Platform) CD-ROM, which contains precompiled binaries of resource-hungry sources for XFree86, GNOME and KDE.

Although Gentoo is commonly known as a distro under which all packages are compiled from source and optimised for a specific machine, the recent addition of a raft of GRP packages cuts down lengthy install times on older hardware, with negligible impact on subsequent performance. Installation is slightly simpler under this latest release, with fewer hoops to jump through, although this is in part due to changes within the wider Linux world. New users should have few problems following the detailed install guide, which carefully walks the less experienced user through partitioning, file-system creation, basic preparation, kernel compilation and associated tasks. The tools and processes involved provide a great overview of a GNU/Linux system, and it's a good thing to get stuck in from the word go with a decent hands-on approach.

As you'd expect from a completely manual install, the level of customisation is excellent, and this makes for extreme usability further down the line. It's tough to argue that a scripted install methodology would really benefit Gentoo, but the lack of automated tools can really be felt when performing lengthy, repetitive installs across multiple machines. Catalyst is a step in the right direction and using the GRP packages does significantly reduce compilation time, but it's still early days. Meta-grouping of commonly used sets of packages, which could then be emerged in one fell swoop, would also greatly assist set up and configuration of development machines.

However, it's worth arguing that a rather cumbersome, though totally transparent, install process really shouldn't put off any class of user, given the sheer ease of use that an installed Gentoo offers. Users of other distros may well need howtos when it comes to configuring 2.6 kernels or shuffling multiple OpenGL versions, but with tools such as genkernel and emerge, as well a clear, intelligent approach to all configuration files, Gentoo 2004.0 users really do have an easy life. The portage package management system is particularly robust, and a huge range of packages are offered under dedicated ebuilds (Python scripts), which do a great job of managing both dependencies and base configuration.

Although Gentoo 2004.0 lacks the bells and whistles that accompany other such point releases and in some ways feels rather conservative, it marks the maturity of Gentoo as a major distro, consolidating the work of an essential Free Software community.

Reviewer: Martin Howse

THE VERDICT

Product: Gentoo 2004.0

Price: Free download

Contact: www.gentoo.org

Pros: Extremely active developer community, very easy to customise and use after an initial install

Cons: Lacks automated install functionality, good deal of work necessary to configure a full system

PDA

Sharp Zaurus SL6000L

State-of-the art PDA that comes with USB, VGA screen, integrated wi-fi and, of course, runs Linux

The Zaurus SL series has failed to grab the Western world, although its sibling C series has had moderate success in Asia. This SL6000 is Sharp's comeback attempt and boasts faster hardware than previous models, a slightly improved PIM software package, and many additional applications available online. However, the closed-source dependency is worse than ever and most applications depend on Sharp's libsl library.

The SL6000L comes with an XScale 400MHz processor, plus 64Mb of RAM, 64Mb of ROM, an integrated keyboard, integrated full-duplex microphone and speaker (positioned on the back of the Zaurus, like on a phone), a 640x480 VGA screen that can be used outside (and is even better than the famous C series' crystal-clear screen), and vast expansion possibilities provided by Compact Flash, SD Card, IRDA, USB-host plus an extension port that makes another Compact Flash slot and an additional battery available. The main unit comes with a transparent removable screen cover to protect the fine Zaurus screen from scratches.

In contrast, the cradle is poor: it's huge and plastic, and it feels more like a toy than part of a PDA. Fortunately you can directly connect the charger to the Zaurus and use the wi-fi connection for desktop synchronisation.

The most interesting features in terms of hardware are the record button, which makes it possible to use the SL6000 as a dictaphone, and the very convenient placement of the battery, which can be hotplugged and replaced by a fully charged unit in a couple of seconds. The USB host capability is also a godsend. This makes it possible to plug any USB 1.1 peripheral into the Zaurus, although the necessary cable is sold separately. Buying it will allow anybody to connect the likes of a USB hard disk in order to store digital pictures on the go, meaning it's certainly smaller and more convenient than carrying a laptop.

Another very interesting feature is the integration of wi-fi, which vacates the Compact Flash slot, ready for other peripherals.

Apart from a few gripes, the hardware is otherwise excellent and very fast in day-to-day use. While there is still a two-second power-up delay, it does not feel as intrusive as the long delay other models experienced. The battery life is good, with about two hours on offer when wi-fi is used, and the hotpluggable battery is an excellent and well-implemented idea.

The multiple buttons are quite handy: only two of them, power and record, can power up the device, which avoids any accidental battery drainage when the Zaurus is carried in a pocket. The record button is a good idea, even if the power-up delay can result in truncated voice memos.

Most of the effort in the development of the SL6000L seems to have been concentrated on the software suite: it's as good as the C series suite but has full English support and many assistants to ease set up.

The PIM suite is still not that good but many replacement applications can be downloaded (such as abook, qualendar or iqnotes), and it is slowly improving and becoming more usable. The real problem is it only syncs with IntelliSync to Windows computers – the total absence of any GNU/Linux synchronisation software is problematic.

The Internet and office suites are still the best available: Hancom office, Opera and qtmail really feel like complete, integrated and polished applications.

The launcher now supports themes and background pictures, and allows you to edit the software categories. The applications feel globally easy to use, although they perhaps take a little too much time to start up. Some of the old applications also make poor use of the 640x480 resolution and sometimes only run in 320x240.

The SL6000L's software and hardware combination means it is ready for mainstream users. It feels like a version 1.0 – good, ready, with room for some improvement. The decision to keep some software proprietary is unfortunate and is something you'll have to deal with yourself. What's a little baffling is that the closed-source Sharp software components are not on a par with their Free Software equivalents (OPIE PIM, kitchensync, customised accelerated kernels). On the other hand, if you're capable of serious hacking, the use of this software on the SL6000L should not present any issues.

The SL6000L is currently only available in the United States. For UK purchasers, there's the possibility of having one shipped or, perhaps more sensibly, trying out one of the C series designs that lack the built-in wi-fi, USB, recording and battery hotplug, but which can be bought from sites like http://shirtpocket.co.uk.

Reviewer: Guylhem Aznar

THE VERDICT

Product: Sharp Zaurus SL6000L
Price: US$639
Contact: www.myzaurus.com
Pros: Small, neat, powerful, good build quality
Cons: Expensive, annoying closed-source software choices

NOTEBOOK

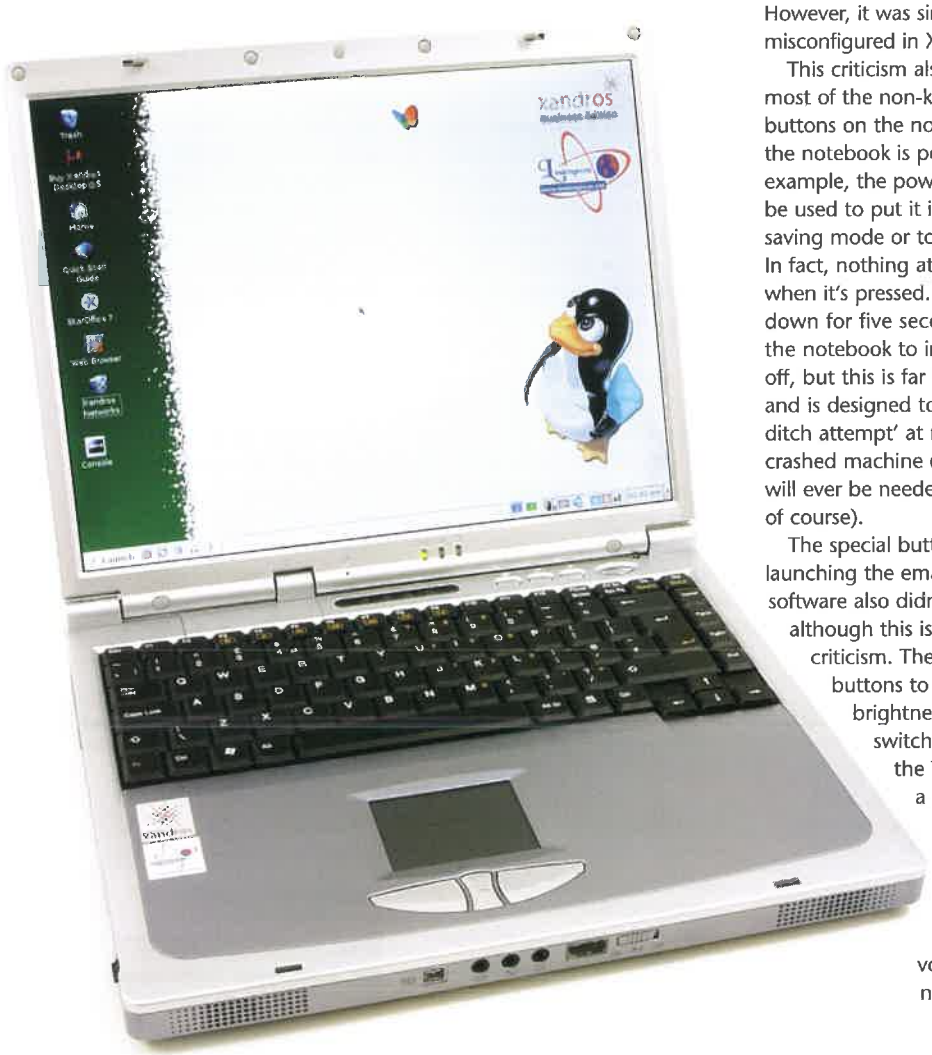
Lindengrove Innovace 4105

Powerful Linux-equipped notebook that should cater to every grade of user

As we discuss in our feature on page 31, there aren't many system builders offering machines that have Linux preinstalled. It's a bizarre and scandalous state of affairs in which practically the only choice with every new PC sold right now is a Microsoft product. This will undoubtedly change at some point in the future, but taking the first brave step is Lindengrove, which is offering the Innovace 4105 notebook. This comes preinstalled with Xandros Desktop OS Version 2 Business (the same distro that is supplied, in evaluation form, on one of coverdiscs of this month's *LinuxUser & Developer* technical edition).

Considering that, by their very nature, notebooks are aimed at the business and home user markets, the use of Xandros is a masterly move. It's certainly the most Windows-like distro out there and boasts stunning hardware compatibility. Attach an external CD-ROM drive, for example, and it will not only be recognised immediately but also automatically mounted and made available. No command-line work is necessary and whilst hardcore hackers might tut, this is undoubtedly a boost for a computer that may well be used by non-techies, such as sales staff or students.

The hardware in the notebook is similarly powerful. At its heart is a Pentium 4 2.4GHz chip, which is coupled with a 533MHz bus speed and 512Mb of fast DDR RAM. ATI graphics are coupled with a large and bright 15.1in TFT screen, which provides 1,024x768 resolution. Additionally, the notebook comes with Bluetooth, optional built-in wi-fi, three USB 2.0 ports, and a mini-Firewire port.



Although necessarily large because of the screen, the notebook is relatively lightweight and slim. The keyboard is a joy to use and has cool translucent keys. This is an OEM notebook and maintains an 'unbranded' feel, without any obtrusive manufacturer nameplates. This might be appealing to some but, whatever the case, the notebook appeared solid and very well constructed throughout.

The mousepad is sensitive and includes a rocker scroll button between the left and right buttons. Alas, this didn't work on our demo machine, in that it didn't scroll windows in the way it should. It was able to move back through the site history in Mozilla, however, which indicates that its hardware function had been recognised by the kernel. However, it was simply misconfigured in XF86Config.

This criticism also applies to most of the non-keyboard buttons on the notebook. Once the notebook is powered-up, for example, the power switch can't be used to put it into power-saving mode or to shut it down. In fact, nothing at all happens when it's pressed. Holding it down for five seconds causes the notebook to instantly switch off, but this is far from useful and is designed to be a 'last ditch attempt' at resolving a crashed machine (not that this will ever be needed under Linux, of course).

The special buttons for launching the email and browser software also didn't work, although this is less of a criticism. The function buttons to control screen brightness and switching between the TFT screen and a monitor did work, but the identical buttons to alter the sound-card volume didn't, nor did the buttons to put the notebook into sleep mode.

Lindengrove points out that these functions rely on ACPI functionality, which is relatively young in the Linux kernel, and it was more concerned with producing a stable notebook. This is a fair comment but, on the other hand, configuring the buttons to work merely requires the download and configuration of a few well-established scripts. Most half-competent Linux users will be able to configure this aspect themselves but beginners will be left in the lurch.

Other than that, however, the notebook offers a complete solution with no further software necessary. Xandros comes with Star Office as part of the deal and, if that doesn't take your fancy, you can purchase and install Microsoft Office using the supplied CrossOver software. Multimedia is preconfigured, including Internet streaming, and sound is provided courtesy of the stereo speakers that are built into the unit at the front. We tested the Firewire port by attaching a brand-new DVD rewriter and within seconds it was recognised and made available in Xandros' file manager. This really is very impressive.

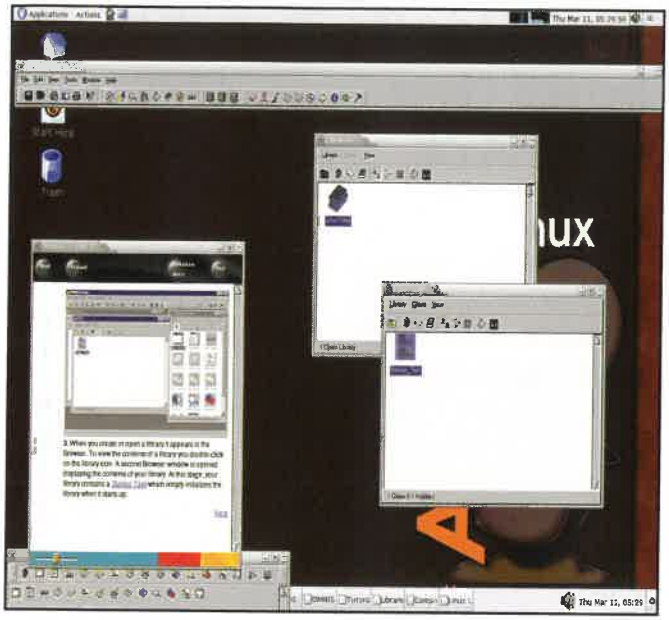
The notebook costs around £836, including VAT. This puts it into the middle price range for notebooks and, considering the very powerful hardware on offer, is something of a bargain.

Although any company offering a Linux-equipped computer is to be commended, we had to mark Lindengrove down slightly because of the poorly configured notebook buttons. It felt a little like Xandros had simply been installed on the notebook without any final system-dependent tweaking, which isn't what we'd expect from any system builder, regardless of the OS on offer. If Lindengrove can fix this small aspect, it'll undoubtedly have a winner on its hands.

Reviewer: Keir Thomas

THE VERDICT

Product: Innovace 4105
Price: £712+VAT
Contact: www.lindengrove.net
Pros: Complete solution that shows off the full desktop glory of Linux
Cons: Could be better configured



Omnis Studio features online help to get you started immediately

RAPID APPLICATION DEVELOPMENT

Omnis Studio

Promising RAD tool which could make software design a game of point and click but which needs a little work

Rapid Application Development (RAD) tools aim to make life simpler for the overworked software engineer who must constantly struggle to balance the increasing complexity of modern computer software with the time and financial constraints that are now part of the post-dotcom era. It seems like yesterday when we all first used Borland's Delphi 1.0 release on old Microsoft Windows PCs to quickly develop some sort of database application, which had to be ported from an old Paradox database system. Time has moved on, and over the last decade we have seen a growing number of RAD packages for Windows. In the last few years these have started to appear on Linux, too.

Omnis started life in the 1980s when founder Paul Wright set up the first Apple dealership in the UK. In 1982, Omnis released a database product for the Apple II and in 1989, it produced the first cross-platform development tool for building applications under Windows and Mac. The Omnis story shares some similarity with that of Borland (who produced Paradox and later Delphi) and also even Microsoft (who bought Fox Pro). It has tried to stay ahead of the competition and in 1997, boasted one of the first cross-platform Windows, Mac and Linux development suites – Omnis Studio. In 2000, Omnis merged with PICK corporation and became Raining Data.

Omnis Studio is now on its third major release and a fourth is planned shortly. Version 3.3 targets two different uses: conventional standalone application design and Web-based applications using the Omnis Web Client browser plug-in technology. The software comes on a single CD for all platforms and should be easily installed using the directions provided. The supplied tutorials aim to help new users to get up and running with the visual component libraries and wizards to tie forms into Omnis database sources. Application design is now a case of creating a new Omnis 'Library' (the term they use for a project or new application) and bringing in the necessary components. The software has a look and feel similar to the old school Unix Motif toolkit, as can be seen in our screenshots.

Setting up the program proved difficult. Our initial attempt to test it out on a Debian desktop resulted in a warning from the dynamic loader that the application was incorrectly built. This was followed by a segfault. Running the installer through a debugger confirmed that it wanted root privileges but was not asking us to provide this or, indeed, providing any useful feedback apart from a crash. Having performed the install by hand and kludged in various LD_LIBRARY_PATH settings, we discovered various other library versioning dependencies that prevented us from running it successfully. So we gave up.

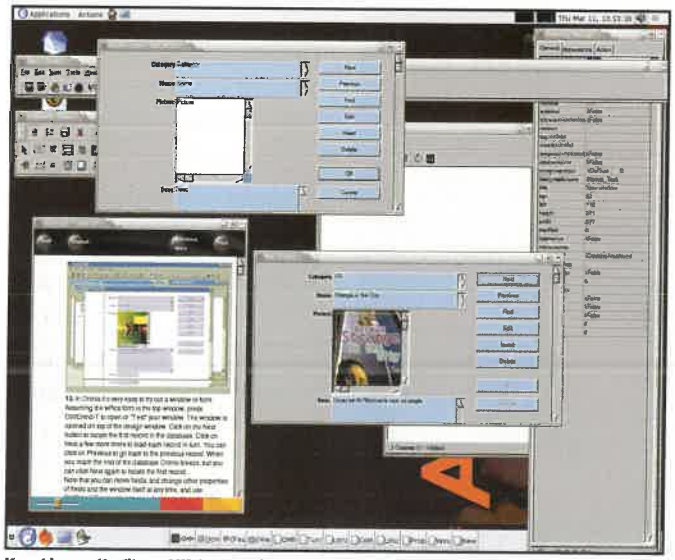
We decided to install a fresh copy of Red Hat 9 (from a previous *LinuxUser & Devleoper* coverdisc) on an old PC and perform the install again. After another horrible crash, we ran the installer as the root user and completed a default install, which is in /usr/local/rainingdata/oss33. When attempting to run the software following an install, we were greeted with another library issue. This time, setting the LD_LIBRARY_PATH to the install directory did the trick.

The software installs itself to a directory where only the root user can use it, and again produces a nondescript error when run by an ordinary user account. There are some instructions on the website that describe how to overcome this and similar problems, but these issues should not have existed in the first place. Any software design suite that does not correctly provide useful error messages is borderline useless in itself.

The tutorial takes new users through designing a simple example form-based application that is also Web accessible using the Web technology. It ties in to a provided database and works reasonably well. Unfortunately, the tutorial is misleading in several places and generally not quite as polished as one would like. As new users we wanted to get to grips with the scripting language, which enables more powerful control of an application, but were again somewhat frustrated by the experience. Generally, it seems that the software works reasonably well but has been a straight port from a Windows or Mac setting without much concern for the different nature of Linux and its users.

All that's needed to make Omnis Studio into an exceptional product is a little examination of the user experience and some polish. On the whole, the software appears to offer reasonable value for money and could potentially be snapped up by many developers who once used RAD tools on Microsoft Windows. We look forward to seeing future incarnations.

Reviewer: Jon Masters

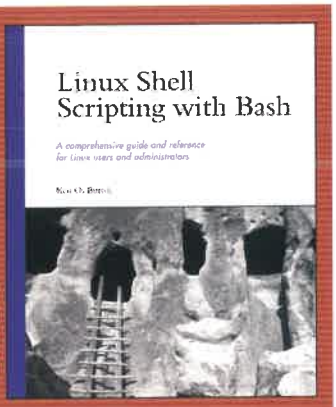


Knocking up the likes of Web-accessible databases quickly isn't difficult

THE VERDICT

Product: Omnis Studio
Price: 250 Euros+VAT
Contact: www.omnis.net
Pros: RAD tool for Linux allows Web application development
Cons: Tricky to install and unintuitive

Linux Shell Scripting With Bash



Author: Ken O Burtch
Publisher: SAMS
ISBN: 0672326426
Price: £25.50

A COMPLETE RESOURCE-MONITORING AND TROUBLESHOOTING SCRIPT IS INCLUDED

The default Linux shell, bash, seems to be making something of a comeback when it comes down to simple scripting tasks. Rapid Application Development tools with simple bolt-on GUIs and Web-based integration features, or higher level interpreted languages such as Python, may seem sexier than poor old bash, but, when it comes down to integration with the core OS, bash wins hands down. And it's so much easier to perform simple tasks under bash, or hammer out a basic menu-based app. It's also worth stressing that shell scripting never went away. Within financial institutions and many large businesses, bash is an essential tool. And, thanks to this eminently usable title (published within the excellent Developer's Library series), new users and sysadmins can gain a serious overview of this powerful real-world scripting tool.

The author, Ken O Burtch, usefully stresses the core qualities of any shell. Rather than presenting bash as a simple tool which can be used to perform certain limited tasks, Burtch regards bash as an essential programming environment. His approach is flexible and exploratory, yet at the same time rooted in real-world concerns. A good number of configuration and code examples are well presented, and the style is lively and demanding. This makes for some great tutorials which pull apart both interactive work with the shell and more complex shell scripting. The basics of scripting are handled intelligently, with detailed material covering variables, expressions, and compound commands. Reference sections also help to clarify material and form a highly useful resource.

Shell scripting is all about integration with the core Unix environment, and this title really pushes the envelope when it comes down to working with modern technologies. Alongside more common examples which work with and process all manner of text file, advanced network programming, data structures and database techniques are discussed, with highly usable, lengthy sample code. Shorter code examples demonstrate how easy it is to use bash as a simple scripting language to extend or customise higher level C code. Appendices provide a full rundown of bash switches, signal values and error codes and a complete resource-monitoring and troubleshooting script is included which shows off bash at its best, performing exactly the kind of essential real-world task which bash excels at. Thanks to the emphasis on bash as integrated environment, Linux Shell Scripting also throws some light on the complete Linux system, providing an intelligent overview of interactions between OS and application.

Teach Yourself Red Hat Linux Fedora In 24 Hours

Author: Aron Hsiao
Publisher: SAMS
ISBN: 0672326302
Price: £21.99

WORKING AT THE COMMAND LINE IS DESCRIBED AS AN ESSENTIAL FOUNDATION

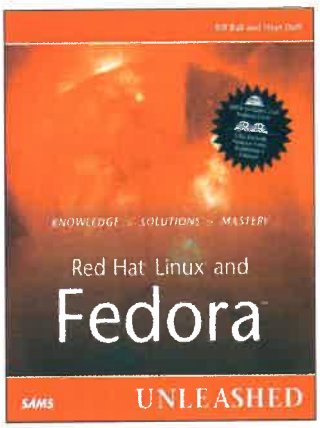
Breaking down complex tasks into easily achievable chunks is a seriously attractive proposition. The 24 Hours series of titles attempts to take the stress out of acquiring a new skillset, offering step-by-step tutorials, notes and tips for smaller, well-defined tasks and tools. Such an approach is difficult to pull off at the best of times, but given the complexity of a modern Linux system such as Fedora, it does appear to be an almost impossible task.

Teach Yourself Red Hat Linux Fedora does have a lot of things going for it. Tutorials covering basic installation, login and simple configuration provide a good level of detail, and well-annotated screenshots should help out the absolute beginner. Simple tasks and tools are well described with both levity and clarity, and this Teach Yourself title takes an admirable approach to core Unix skills. Working at the command line is described as an essential foundation, and a few hours are devoted to shell skills and filesystem management. Later chapters cover command-line sysadmin skills and shell scripting, and, surprisingly for such a title, LaTeX basics are also covered. However, hour-long tutorials covering basic Fedora desktop use do sit uneasily with this hardcore command-line approach. Sure, both environments can co-exist easily, but the style and level of detail is uneven here, which may unnerve or confuse the beginner. Teach Yourself treads a fine line, aiming to offer the best of both worlds, but there simply isn't enough room for manoeuvre within the 24-hour approach.

That said, Teach Yourself does successfully impart a good, basic knowledge base, and with Fedora Core included on two CD-ROMs, it does make an attractive package for the newbie. Core skills are approached with ease and confidence and complex everyday packages such as OpenOffice are dissected competently.

Red Hat Linux And Fedora Unleashed

Authors: Bill Ball et al
Publisher: SAMS
ISBN: 0672326299
Price: £36.50



DIGS INTO MINOR BUT USEFUL DESKTOP CONFIGURATION DETAILS

As publishers rush to update older Red Hat titles towards the now ubiquitous Fedora Core, bookstore shelves must be seriously suffering under the sheer weight of new titles. Fedora Unleashed is probably one of the heftiest volumes around, offering a comprehensive overview of the Fedora

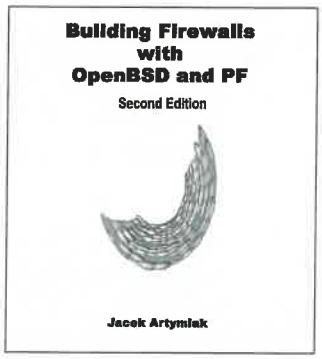
Core experience. In common with many other such titles, Unleashed throws in a full distribution on bundled DVD. But it's good to see that users of older hardware aren't left out in the cold, with a double CD-ROM offering also included.

Given that Fedora excels within corporate and small office environments, Fedora Unleashed usefully stresses key tasks and configurations which relate to these situations. Basic installation and set up issues are covered in exemplary detail with a scattering of useful hints and tips, and carefully chosen examples and screen shots. Fedora Unleashed also digs into minor desktop configuration details which could easily mar a large-scale corporate install. The Kickstart automated install method is also dealt with efficiently in a detailed step-by-step tutorial.

The emphasis is on gaining a thorough understanding of how a Linux system fits together, and how best to work with a good range of both command-line and more Red Hat-specific tools. In many cases, a variety of tools are considered to attack the same task. System and system services administration issues are given the lion's share of the coverage, again reflecting the needs of those seeking to deploy Fedora in serious working environments. A good range of services are ably described, from DNS and Apache, right through to database services such as MySQL and PostgreSQL, and complex electronic mail setups making use of tools such as Procmail and Spamassassin. The level of detail is excellent throughout, with examples detailing a good range of configuration options for each package. Scripting under both bash and Perl is well explained, which is great for would-be sysadmins, but cursory coverage of more complex programming tools is far from useful. And although interoperability issues and cross-platform tools do receive some attention, much more could be made of these essential topics. It seems that although this Unleashed title has been intelligently updated to reflect changes in the Red Hat experience, little has been done to add material which covers more modern technologies and working practices.

Building Firewalls with OpenBSD and PF Second Edition

Author: Jacek Artymiak
Publisher: devGuide.net
ISBN: 8391665119
Price: £49.99



CONVEYS CORE KNOWLEDGE OF KEY TECHNICAL ISSUES

Although it's easy for newbies to become confused as to the strengths and weaknesses of the various BSDs and specific Linux distros, OpenBSD stands out from the crowd with its absolute stress on security. Despite this emphasis, until recently, those wishing to firewall large networks using OpenBSD would be in for a tough ride. Although community-led documentation is far from sparse, collating information on installation and configuration issues, firewall design and implementation, and both logging and management is a seriously time-consuming business. Thankfully, this excellent work provides clear, step-by-step tutorials and sample implementations for those new to both firewalling and OpenBSD. This niche title adds up to a complete firewalling solution which should easily earn its keep protecting mid- to large-scale, vulnerable networks.

Building Firewalls is situated agreeably as a community title. As well as reflecting technical changes made to both OpenBSD and pf, Daniel Hartmeier's widely used packet-filtering tool, this second edition has also been recently updated in response to readers' requests and suggestions. It's a publishing model which pleasantly reflects the best features of Open Source development and it's worth mentioning that the OpenBSD project also benefits from the additional income generated from sales of this excellent work. It's obvious that author Jacek Artymiak has a good deal of in-depth experience both of the OpenBSD community, and of hardcore firewalling and network scenarios. The level of detail is pitched exactly right, conveying core knowledge of key technical issues with an easy style which reflects the author's position within the developer community.

Both OpenBSD and the pf packet filter are well integrated, mature and very secure, and Building Firewalls makes light work of setting up a complete firewalling solution which is easily configurable across a range of networking scenarios. Rulesets are the heart of the matter, with plain text files describing a well-defined firewalling policy. As you can imagine, Building Firewalls devotes a good deal of attention to these rulesets, and the basics are explained and described clearly. Appendices also lay down rule templates and rules for a range of configurations. Given that OpenBSD offers a slow development model, mature codebase and heavily audited security-oriented release cycle, it's tough to opt for Linux when it comes down to serious firewalling solutions. And the only real argument that documentation is far more readily available under Linux has been seriously thwarted with the publication of this essential title.

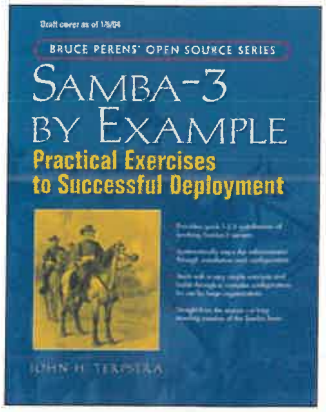
Samba-3 By Example

Author: John H Terpstra
Publisher: Addison-Wesley
ISBN: 0131472216
Price: £24.67

COVERS KEY TECHNOLOGIES SUCH AS LDAP AND KERBEROS

Although the readily available Samba HOWTOs and the recently published Official Samba-3 HOWTO provide more than adequate documentation for a good range of features and functionalities, Samba users have until now been starved of sample configuration files and cookbook-style solutions. Samba-3 By Example, subtitled 'Practical Exercises to Successful Deployment', does a great job of providing thoroughly documented, eminently usable Samba configurations for particular networking contexts. The approach is hands-on, and bundled configuration files, scripts and tools on CD-ROM make for a well-rounded package which is built for business.

Author John H Terpstra gets right down to work, offering an extremely practical introduction to the peculiarities of Windows-based networks. Ethereal is the tool of choice here, providing a decent real-world view of a range of networking issues. Although new users are walked through more generic aspects of configuration and setup, a degree of knowledge of both Microsoft Windows and any Unix-like OS is highly recommended. Terpstra's non-nonsense approach to Samba-based solutions pays dividends when it comes down to presenting detailed analysis of a huge range of Samba configurations. Smb.conf examples range from the simplest working examples for peer-to-peer networking, through larger, secure office networking examples, to configurations which provide seriously complex, integrated, authenticated services. Along the way, key modules, and technologies such as LDAP, Microsoft Active Directory and Kerberos are well discussed, and NT4 Domain migration is examined in fine detail. Each chapter, which addresses one real-world aspect of Samba-3 configuration, is introduced with the description of a networking solution sought by a fictional company, Abmas. This approach, as well as spicing up what could be rather dry subject matter, provides a sound context for a range of solutions, and offers invaluable information as to how Samba-3 can be used and configured successfully in medium to large businesses.



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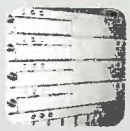

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